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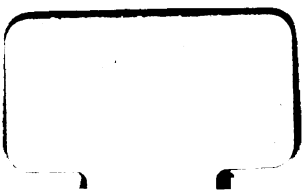
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HANDY MAN'S MANUAL OF FACTS AND FIGURES

KC 4670

Gift of The People of the United States
Through the Victory Book Campaign
(A. L. A. — A. R. C. — U. S. O.)
To the Armed Forces and Merchant Marine



Handy Man's Manual

of

Facts and Figures

By

JAMES D. MILFORD

Edited by

THEODORE WATERS

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Handy Man's Manual
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Introduction

This is not an exhaustive book about the subject of handy-work around the farm and the house. Neither is it exhausting, as you will learn on a careful reading of the many important subjects treated by the editor.

"Next thing to knowing a thing is knowing where to find it."

If the subject you want light on is not treated in this work—of course we refer to things about the farm—it tells you where to find it.

The subjects treated are many and varied, but there is not one that is not instructive.

We heartily commend this book not only to the farmer, but to every American who would know more about our great country and its growth and resources.

Handy Man's Manual of Facts and Figures

CHAPTER I

SUCCESS

A Relative Term—As to Wealth—A Definition—Dignity of Work—The Tiller—Examples—Want of System—Obsolete Methods—Brains Count.

Success is a relative term. What one might call success would be but mediocrity, in some cases, failure to another. Everyone has his own idea of success. His conception depends upon environment and circumstances and the situation in life in which fate has cast him. To the politician or statesman, success means the gratification of his desires in office, the fulfilment of his plans and schemes; to the

merchant it is the triumph of his business methods, the outdistancing of competition in his own particular field; to the scientist, the savant and the scholar, it is some crowning achievement which brings to fruition long years of study, and perseverance. Peary, for instance, has crowned the labors of a life time with what he considers success in discovering the North Pole.

To a great many, success is taken as the fulfilment of ambition, but this is a mistaken idea. A man may realize his highest hopes and desires, but at the same time be very far from a successful man as far as the world judges him.

AS TO WEALTH

The acquisition of wealth does not stamp a man with the hall-mark of success. Some of the wealthiest men are the most abject of failures as far as doing the world any good is concerned. Money-bags so far from being a synonym of success, on very many occasions is the opposite.

When you see an individual, rich, powerful, of great influence in the community, you are apt to say: "He is a most successful man," but you may be very much mistaken in your conception of him. Neither wealth, nor power, nor influence

nor social standing count in the indeterminable something we call "success."

A DEFINITION

Were success definable we might term it the accomplishment of what is good and beneficial to ourselves and our fellow men. He who has lived in the world without doing good has lived in vain. Every man is sent into the world with a mission and unless he keeps true to his mission and accomplishes results, he is a failure. When he is true to it, when he lives according to the laws of God and does all the good he possibly can, making the world brighter and better and holier by his presence, when he lightens the burdens of his fellow beings and cheers them on to the goal of useful endeavor, so that they too will accomplish results and add to the sum of the world's advancement in goodness, then he may be called a successful man, no matter in what position of life he may be placed. The poor can be as successful as the rich, the beggar in this respect can eclipse the king.

He who does his duty in the sphere of useful endeavor and lives according to the canons of a true manhood, is living up to his mission, fulfilling his destiny and can be lawfully stamped as a success in life.

Nature has an assigned place for every-

thing and everything has a duty to perform in that place. The flower blooms and exhales its fragrance on the air, the brook babbles along over its pebbly bed, the soft winds fan the trees and the hills, the sunshine illumines the valleys and fields, the birds chant their notes as they flit from bush to bush, the lion and tiger roam through the jungle, in a word, Nature, inanimate as well as animate, responds to the laws of universal creation.

If you want to be successful set out to do good, to make the world better, to add to the sum total of human happiness. Cast sunshine around you, radiate joy, drive the ghouls of gloom into the shadows where they belong, and make your surroundings so bright that all will be attracted to you.

"If I had power to play the enchanter's part,
I'd cast a bliss all round,
Till not a sigh or aching heart
Would in the world be found."

THE DIGNITY OF WORK

If you're only a street sweeper you can make your life a success by doing your duty as a street laborer. Have a smile and a cheery word for everybody. If you see a lame man assist him across the street, if an old lady drops her spectacles, pick them up and hand them to her with a polite bow,

but above all, don't neglect your work. Keep your part of the street as clean as it is possible to make it, and thus you will be doing your duty and winning success.

The farmer can be a conspicuous success, but in order to become so he too, must do his duty and he has many duties to perform to live up to his state in life and satisfy the demands of his situation. Perhaps in no other field of ordinary endeavor are there more opportunities to emphasize what stands for success than in the regulation and mode of conducting the farm and its appurtenances.

THE TILLER OF THE SOIL

In order to be successful the farmer must bring intelligence to bear in his work. He has duties to perform, just as in any other walk of life, where duties are imperative to success, and they must be performed in the best manner in order to obtain the best results. There are no lands so barren, so wild or so desolate that they can not be made to blossom as the rose under right management.

The success of the farmer depends upon taking out of the soil the very most that it will produce. To do this he must understand the nature of the soil and how to treat it to produce the heaviest crops. Every farm, however poor the soil, can

be made to pay, to give good returns for the time and labor expended on it. On the farm, as elsewhere, industry and knowledge are rewarded, while indolence and ignorance lead to the one inevitable result—failure.

All over this country at the present time wild and hitherto unproductive lands are being turned into veritable gardens teeming with the plenteousness and bounty of great yields, and this on account of the way they are worked and managed by men and women who are skilled in agriculture and give attention and care to their business.

EXAMPLES

On Long Island within twenty-five miles of New York City, fully 250,000 acres of the worst land have been reclaimed by the Long Island Railroad and turned into remunerative farms which in themselves could supply all the wants of the great city. At first the whole of the island was considered impossible of productive tillage and most people regarded it as useless for cultivation in any way. One of the first experiments was made at Wading River. Eighteen acres of the most desolate waste conceivable were staked out; the soil was shallow, sour and cold and seemed incapable of producing anything and, moreover,

there was no good water within a couple of miles. The experimenters, however, had hopes for success and went to work. The trees were felled and the underbrush and scrub were cut away, while the stumps were blown out with dynamite. Stumps and roots were piled and fired, and the ashes used for fertilizer. Two worn out express horses and three Italian laborers did all the work under the supervision of the experimenter, who, by the way, was a city man and had had no previous practical experience.

Nothing was employed, no extras that were not available to the poorest farmer. The building erected was as simple and inexpensive as could be used for living purposes. An old freight car was used for housing the Italian laborers. The stable for the horses was simply a loose box at a little distance from the dwelling. Before the clearing commenced a well was driven and plenty of good water obtained. By the end of Autumn a clearing was effected at little cost and the following spring the ground was seeded with 218 varieties of fodder, crops and vegetables, including potatoes, corn, cabbage, cauliflower, turnips, carrots, radishes, beans, peas, tomatoes, onions, melons, endive, beets, parsnips, alfalfa and millet. An acre was turned into a fruit orchard and apples, peaches, pears,

quinces, cherries, prunes, apricots, nectarines, and Japanese plums, as well as currants, gooseberries, raspberries, grapes, strawberries, asparagus and rhubarb, flourished from the start.

Within eight months from the beginning of the experiment the former wilderness had been converted into a fertile farm set out with 380 varieties of plants, all of which yielded from 18 to 20 per cent. profit.

Every year since the yield has increased and consequently the profit has been much greater.

WANT OF SYSTEM

In many cases there is a lack of systematic farming. When the soil becomes exhausted the proper constituents are not returned to it to enable it to sustain plant life and produce succeeding crops. The rotation of crops, in many instances is very imperfectly understood, while the care and management of domestic animals are much at fault.

Over in England they can get 300 bushels of potatoes to the acre, even under intensive farming, that is where the land has been cropped for hundreds of generations, while here in America on comparatively new soil, we cannot exceed 90 bushels an acre. In the great West we are raising

only something like 13 bushels of wheat to the acre in the best areas, where we ought to be raising fifty.

It is surprising how little land is required to give a good living to a family when properly cultivated. Even an acre of ground will do much. What seems like wonders has been accomplished on an acre and less. For instance one irrigated acre has for thirty years given a man of Glenn County, California, a good living besides enabling him to save $400 a year.

Another man near Reading, Pennsylvania, takes from $1,200 to $1,500 yearly out of 2½ acres.

No one can fix the producing powers of an acre under right conditions. On a little farm near New Cumberland, Pennsylvania, $454 were got from an acre of early tomatoes and an equal amount from an acre and a half of later tomatoes. An acre and a half of strawberries brought $555 and cabbages averaged $300 per acre.

A woman on Long Island on a 25x50 foot patch raised not only enough lettuce, radish, beets, onions, peas, tomatoes, lima beans, parsnips, peppers and squash to feed a family of three, but cleared $50 additional on sales. On plots of 50 by 100 feet in many cases whole families have been maintained.

OBSOLETE METHODS

A great deal of our bad and unproductive farming arises from adherence to old methods. Men stick in the same rut. If you propose scientific methods of tillage to many farmers, they will tell you they do not want any new-fangled ways, as they call them, and that the methods of their fathers and grandfathers are good enough for them. They know that the Government is distributing tons of literature on agriculture, but they'll have none of it and they will not permit scientific teachers. "We have been farming for ten generations," they say, "and we will have no upstart College man come along and tell us how to plough." They simply refuse to keep abreast of the times. When any of the farms of such "old timers" comes into the hands of a modern systematic agriculturist, the effect of the change is soon seen. The newcomer knows the uses of irrigation, the value of fertilizers, and the advantages of the rotation of crops. He is not afraid to cultivate his fields in a drought. He takes the means of restoring the constituents robbed from the exhausted fields through ignorance. He understands that the liming of the ground, good tilth, the ploughing under of green crops, the growing of leguminous or pod-bearing

crops, go hand in hand in restoring the soil. Leguminous crops include peas, beans, clover, alfalfa, and all plants that are pod-bearing.

BRAINS COUNT

Brains tell in farming the same as in every other department of human endeavor. A great painter was once asked with what he mixed his paints to produce such beautiful colors. "With brains, Sir, with brains," he tersely replied. The farmer must bring brains to bear on his farming and he must be in love with his work. No one has ever yet really succeeded at anything who was not truly devoted to it. The farmer who looks upon farm work as drudgery even though he may not have to do much of it himself, goes about his business half-hearted and spiritless and will never make a success. Such a one had better try something else, but the chances are he will be a failure in every line, for nowhere, in no department is much accomplished without earnest, intense effort.

It is utterly imperative for the farmer to adopt modern methods. The world moves and we must keep pace with it. Within the last fifty years, yes, within the last twenty years, the science of agriculture like almost every other science, has been revolutionized. This is emphasized by the

comparison of two farms on one of which scientific methods are adopted while the old style prevails on the other. There is quite a difference.

It takes modern knowledge to know the rotation of crops and what things can be double-cropped or companion-cropped, what plants exhaust the soil and what restore it, what weeds can be turned over for manure instead of being pulled up, how deep to plough, what seeds to select, the care and management of growing crops, their harvesting and the thousand and one things connected with farm management.

The up-to-date farmer is giving his attention to crops that are in most demand. He is not only growing so much of the staple crops as he knows he can dispose of at a profit commensurate with the labor spent upon them, but he is raising more vegetables. If a farmer lives convenient to a city or large town, vegetables are a source of much profit, clearing from 100 to 500 per cent. on the cost of raising them. It is a bad year when a farmer cannot clear from $200 to $500 net on a single acre of miscellaneous vegetables.

To get early vegetables the richest soil, the sunniest location and a hotbed are required.

FRUIT

Fruit growing is another good source of

profit to the intelligent farmer. There is always a demand for fruit and many kinds are exported, especially the apple. The first requirement is to make the trees grow vigorously, either on poor or good soil. Poor soil can soon be turned into good orchard soil. It must be deep and moist, but at the same time, well underdrained. The orchard should have an elevation with a northern exposure. Organic matter in the form of stable manure or clover crops must be applied in the Fall or very early in the Spring to keep up the supply of humus in the soil. Good fruit crops may be raised on land too stony for other agricultural uses, if the soil about the young trees be well worked and the moisture retained by means of mulch. Grafting has come to such perfection that fruit trees may be made profitable early instead of waiting six or seven years for maturity.

The small fruits such as raspberries, gooseberriess, blackberries, strawberries, currants, if properly cultivated will repay the time and labor spent upon them. Strawberries require a clayey loam. As many as 3,500 quarts have been raised on an acre. Blackberries have yielded as high as 10,000 quarts to the acre,—the average is about 3,500 quarts.

The great consideration in fruit growing is to be near a good market. Shipping

long distances is liable to cause loss by decay, while the freight charges materially lessen the profits.

STOCK

Animals can be made very profitable under right management. At the present time many farmers are making money in a way hitherto unheard of. What do you think of snails as a source of income? Several are engaged in raising the epicurean molluscs. Little plots of dark loamy soil are converted into snail parks and enclosed with smooth tarred boards. The snails are covered with damp straw and fed on minced lettuce and cabbage leaves. The female snail lays 60 eggs which hatch in 20 days. The delicacy is marketable in 6 or 8 weeks. They are picked in October after they have sealed themselves up in their shells and are put in storehouses to dry for several months. They are cooked in salt water, put up in wooden boxes and shipped to the markets dealing in them, where they command a high price.

OTHER SOURCES OF WEALTH

Some are adding to their wealth by frogs. Frog culture is only successful where the pond is large enough to be partitioned separately, the young from the

old, for the old eat the tadpoles and larvae. There are many frog ranches in California.

Of late diamond back turtles, snapping turtles and the common box tortoise have been raised by farmers. A " crop " of diamond back turtles would certainly eclipse any other, as they are enormously expensive and the demand for them is constantly increasing.

Fish culture has also been tried on farms, but with varying success.

In regard to fowls so much has been expressed on the subject that little remains to be suggested. Fancy chicken raising is attractive, but not always profitable. With ordinary chickens it is different,—they always "make good." It costs nothing to raise them, only the scraps from the table and a few green things which would otherwise go to loss. There is more money in eggs than in chickens. Eggs out of season command fancy prices and it is possible to coax hens to lay out of season.

FOWLS

Ducks are more valuable than hens, now that we know they can be raised away from the water. Ducks wholly land-raised have fewer feathers, but their flesh is more solid and has not the disagreeable oily taste of those reared on the water.

Geese can also be successfully raised

without water; apart from the flesh and eggs the feathers furnish a good item of profit, bringing 60 cents a pound in the market.

Squab-raising is a lucrative business. Pigeons breed about ten times a year, and if the young birds are properly cared for, they can be converted into money very readily, as there is always a good demand for them.

The "poor man's cow," otherwise the goat, is an animal which, though very much despised, can add considerably to the savings bank of the farmer. Ten goats will not cost as much in feed as a single cow. A good milch goat gives 3 quarts of milk a day, and it is about the best in the world. As the goat is immune from tuberculosis, the milk is recommended for consumptives. If bred for marketing, good doe goats bring from $8 to $10 anywhere. Goats' hair can be turned into good money; from three to five pounds of soft, silky hair can be sheared from each animal annually and sold at from $3 to $7 a pound.

Dog breeding, cat breeding and even fox and rabbit breeding are other branches of money-making endeavor which are being carried on throughout the country and in many cases giving handsome yields in the way of money.

Those who do not know how to make a

living cannot make one anywhere. Those who do know, can take care of themselves under any and all conditions.

Farming was never paying better than at the present time, and there is a roseate look-out for the future. Population is increasing, the country is developing, and farming will have to keep pace with the development.

But the farmer to be successful must mix brains with his farming, he must be industrious as well as skillful, and he must persevere. He must be prepared to overcome all obstacles, surmount all difficulties, and plough his way to competence and independence.

CHAPTER II

LEARN THROUGH THE UNITED STATES

The State Department—The Treasury—Agriculture—Pure Food—Other Work—Interior Department.

Next thing to knowing a thing is knowing where to find it.

In intelligence, industry, and capacity for such developments, the farming class of this country equals any other part of the population; but unfortunately our farmers have not availed themselves as they might have done, to increase their information about their own profession, or to add to their knowledge of their own country.

It is not generally known, even by men who are not farmers and have more time to study and learn about such matters, that the United States Government is the greatest instructor, for an adult population, to be found in any part of the world.

STATE DEPARTMENT

Of course, you are aware that the first

officer of the Cabinet is the Secretary of State, but what do you really know about his duties? We do not propose here to give a lecture on our Cabinet officers, but instead, would advise any interested reader to write to the State Department at Washington, expressing a desire to learn about its duties.

Every well-informed person knows that one of the first duties of the State Department is to manage the affairs that arise between ourselves and our neighbors.

We are coming to believe more and more that other nations are not rivals or enemies, but that they are friends and neighbors, and we wish as a Christian people, to live on the most amicable terms with these neighbors. To do so there are laws known as the Laws of Nations, which though not authorized, nor passed by any Congress, yet have come to be accepted as general usage between nations.

The reader of this article is in close contact with his neighbor on the adjoining farm or next door. The lands touch. The same stream may water both places.

The fences may break down, the cattle of one stray into the pastures of the other, but the unwritten law of the neighborhood bars the well-meaning neighbor from quarreling with the man on the other side of the fence. When this trouble arises, the

man who has been damaged drives back the cattle, and reports the fact to his neighbor, that is, if the broken fence is the neighbor's fault.

Now, between contiguous nations little troubles of this kind are continually arising. In the old days war would follow, but now, through the State Departments of the different Governments, these annoyances are allayed, prevented, or arbitrated; the one who has done the damage recompensing the other for an act that was not intended.

All our foreign trade is done with other nations, and we have our consuls and commercial agents in those foreign countries, to take note of all the trade or commerce sent from those lands into ours.

As a matter of fact, we deal with those nations exactly as we would deal with our neighbors on the adjoining farms. We keep open the means of communication, and each shares its proportionate part of the mail transmitted between the countries.

Wars are ceasing largely through the fact that we have learned that wars are cruel and brutal, and that a fight is not the best way to settle difficulties. In other words, we are coming to obey the teachings of the Master, and are working for the day when all nations shall be brothers and dwell together in peace.

THE TREASURY DEPARTMENT

What do you know about the Treasury Department, beyond the fact that you have a general idea that it manufactures coin and bank bills? The farmer, like every other man who has to struggle for a living, receives in some form of exchange, usually money, compensation for the surplus he sells from his farm.

There are farmers living who can remember the days before the Civil War when the only banks in this country were known as "State Banks." These banks, some of which were honest, were largely speculative enterprises too often started by dishonest men in order to rob their fellows.

While the Civil War brought upon us many calamities, and destroyed many of the flower of our youth, yet it resulted in many good things, and one of these good things was the establishment of national banks.

To-day a national bank note, or a United States Treasury certificate or note of any denomination, is just as good as gold, and it will pass not only in the United States, but in any country in the world, at its face value, and this is one of the results of our Civil War.

Money is not capital, it is a medium of exchange, and so may be accounted wealth.

Do you know that all the gold in the world, which is estimated at about five thousand millions of dollars, is only about one-twentieth of the wealth of the whole United States, that is five per cent.?

But it is not our purpose to go into speculations of this kind, but rather to indicate what the United States Treasury is doing and where you can find information on this subject.

Speaking about information as to the Treasury or any other department, you should know that if you write to the Information Bureau of the Library of Congress, you will be furnished with information on the desired subject and also with published matter.

DEPARTMENT OF AGRICULTURE

Excepting the Post Office Department, there is none under the Government that comes into closer touch with the people than that of the Department of Agriculture.

This Department was formerly a very small bureau in the Department of the Interior, and it might have remained so had not the Government awoke to a realization of the needs of the farmer, and a more thorough knowledge of his work.

The work of the Department of Agriculture directly affects the business of a ma-

jority of the subscribers to *The Christian Herald.*

This Department, at a large expense, has established experiment stations throughout the country, and the reports of these stations are regularly published and distributed for the information of our more than six millions of farmers.

If you do not receive any or all the bulletins issued by the Department of Agriculture, then it is because you do not care for them, or do not know how to procure them.

Some of these publications are charged for at the rate of from five to ten, or fifteen cents a copy, but a majority are published for free distribution, and can be had by writing directly to the Secretary of the Department, or to your member of Congress, who will gladly see that you are supplied with them.

WORK OF THE DEPARTMENT

Every year the Department of Agriculture spends tens of thousands of dollars for free seeds and bulbs. These are distributed free, even of postage, to those who desire them. Every member of Congress is entitled to his proportion of these seeds, and he is at liberty to send them free through the mails to his constituents.

You may not know that if you want any particular kind of seed, you can write for it and get it. As a rule the seeds are sent out in little packages with the name of the plant and the method of cultivating is printed on the envelope.

In addition to this work, an immense amount of money is spent in printing the reports of the special bureaus connected with the Department of Agriculture, for free distribution among those interested in the breeding of animals or the cultivation of farm products.

Our farmers, either through neglect or ignorance, or both, have not availed themselves as they should of these splendid educational advantages.

There is no reason why any rural subscriber to *The Christian Herald* should not rapidly accumulate a library of authoritative literature devoted to farming, stock-raising, and gardening, and we might add, to general culture.

This Department not only teaches you what plants to grow, but it also furnishes information as to those insect pests which are so destructive to vegetation and which are so often the curse of the farmer.

Do you know that you can send samples of the soil of any part of your farm to the Department of Agriculture in Washington, and receive a reply, giving an analysis and

telling you just what that soil needs in order to produce any or all kinds of plants?

PURE FOOD

Do you know that the Department of Agriculture, in addition to these things, and a hundred more that might be mentioned, also has a Bureau devoted to the investigation of pure foods? You who live on the farm and manufacture your own foods, with the exception of your groceries, may not have any idea of the adulteration that takes place in the factories that make a specialty of canning goods, or putting up other forms of preserved food.

Dr. Wiley, of the Pure Food Department, has a corps of men known as the "Poison Squad," on whom these adulterated foods have been or are being tested. Through this Bureau the pure food laws have been passed, and these are working, let us hope, for the honesty of the manufacturer, as they certainly are for the health of the consumer.

Dr. Wiley is now carrying on his work along the lines of drug investigation. He is examining the patent medicines that have made the fortunes of so many and have induced the drug habit that has resulted in the disease of alcoholism and morphinism in so many of our people; and he is showing through bulletins issued by this

Department, the great evil that is being done, and so far as the authority of law is of avail, preventing the sale of these pernicious nostrums.

BUREAU OF CHEMISTRY

Another bureau connected with the Department of Agriculture is known as the Bureau of Chemistry. This branch of the Department is carrying on investigations along lines similar to those taken in the case of drugs. But the main purpose of this bureau is to investigate what is known as the "Chemistry of the Kitchen." Cooking, after all, is chemistry of the most useful kind, and chemistry that comes into daily use, for through it, the raw food is changed into a more nutritious and palatable form.

This Bureau not only considers the desirability of the cooked article, but also its nutritive and digestible qualities. Foods which are indigestible are pointed out and the consumer is warned against them, no matter how acceptable they may be to the palate.

OTHER WORK

It is not generally known that the Department of Agriculture is carrying on a series of experiments in the United States

on the growing of tea, which up to this time it was thought could not be done outside of China, Japan, or Ceylon.

The Government has established a tea farm in South Carolina, and the tea grown there is said by experts to equal the imported article.

Tea which costs sixty cents a pound in this country, costs about nine cents a pound in the countries from which it is imported. The excess in price is due to the transportation, duty, and the profits of the middleman.

The Government experts think that tea can be profitably raised in this country, south of the latitude of New York.

In China, Japan and other countries from which we receive tea, the plant or bush is grown very much as we grow gooseberry or other small bushes, but it is thought that the plant could be used in the way of hedges, such as we now use boxwood, or privet. If this could be done, the plant which is ornamental, could be used as a hedge, and in addition would be a source of profit.

We wish to repeat again that in order to obtain additional information on this or any other subject at which we have hinted, it would be well for the reader to write immediately to the Department of Agriculture. It will not be necessary to enclose a

stamp for a reply, as all Government matter comes franked through the Post Office.

THE INTERIOR DEPARTMENT

The reader can get a great deal of information by writing to the Interior Department, which has had its field of operations curtailed by taking away many of its departments, but it still has plenty to do.

The Interior Department has charge of all our public lands, and the reader desiring information on this subject will receive a full, and, we think, a satisfactory answer by writing to the Department of the Interior, and making his wants known.

This Department also has charge of our public parks, and of the vast areas that have been set aside as forestry reservations.

Under the Interior Department is what is known as the Indian Bureau, which has charge of all our Indian affairs. It is well to know that there are about two hundred thousand Indians, until recently nomads, who are now being cared for by the Department of the Interior on special reservations. The Indians on these reservations are fed and clothed by the Government, as it is found well nigh impossible to teach the adult Indian to work. There is, however, promise in the children, and the Government has established schools in which

the children receive a good common school education, and in addition, are being taught farming and the trades.

We cannot place too much emphasis here on the good work that has been done by the missionary societies in this way. The only sad part of it is that missionaries of different denominations have come in and confused the simple minds of the Aborigines, and left them in doubt as to which church or society they should join.

These Indians are a primitive, child-like people. Like all children, they are easily controlled through affection, and can be trained through the better emotions.

The truths of religion are so very simple, and so easily understood, that the Indian, whether adult or child, will easily grasp them if they are properly presented.

HEALTH LAWS

The Department of the Interior has also taken charge of what may be known as the Interstate Health Laws. Each state has its own health department, working under different rules, certainly under a different management, from those of the adjoining state.

In time of infection it is often found very difficult to harmonize these discordant rules, or to keep the people from one state

from passing unhindered into another state, and so it may be, carrying the seeds of disease with them.

Another instance in which the Interior Department has the control of infection between the states is that in the case of rivers.

Most of our large rivers flow through many states. Manufacturers along the river in one state may pollute the water and destroy the fish, and in this way work great harm to the people of another state, living further down the stream. In settling these questions of vital importance, not to the people of one state, but to the people of the whole country, the Interior Department finds it has some very hard problems to solve. In carrying on this work the Interior Department has received great help from the Army Medical Board. This Board favors a National Bureau of Health. Unfortunately the objection to such a board of health arises from the fact that there are so many schools of medicine. We have Allopaths, Homeopaths, Osteopaths, Eclectics, and other schools, each of which wants to be recognized, if indeed it is not allowed to control the whole board.

COMMERCE AND LABOR

Every farmer is a worker, that is a skilled laborer. The Department of Com-

merce has not to do with any one class of toilers. Its purpose is to consider every productive factor in the United States, from the man who digs in the railroad embankment, to the tiller of the soil.

This Department keeps a careful record, by enumeration, of the actual number of people employed in each department of labor, the number of hours they work, and their wages per day or week.

It also keeps a record of the rise and decline of each manufacturing establishment in the country. It investigates the causes of discontent on the part of the employer or the employee. It looks into strikes, and it tries, as best it may, to learn how to settle, and still better, how to prevent them.

This Department gives the clearest idea of our trade up to the present time, and it issues regularly bulletins setting forth these conditions. These bulletins may be had on application to the Secretary of the Department, and they will be sent to each inquirer free of charge.

OTHER BUREAUS OF INFORMATION

We do not think it necessary to refer to the Army, the Navy, or the Post Office Departments, as every intelligent reader is already fairly well posted about these great Government institutions; there is, however,

one of which every reader knows by name, but with the workings of which he is not acquainted. This is the Smithsonian Institution.

This Institution was established in the first third of the last century, by a rich Englishman named Smithson, who devoted his fortune to furthering science in the United States.

Very properly the institution has been named after him. It is now under Government control and it is doing a great educational work. It was under the auspices of this establishment that Colonel Roosevelt recently made his great hunting expedition into Africa.

The "Smithsonian," as it is popularly called, publishes a great amount of the most valuable literature on scientific subjects, much of which must be invaluable to the farmer, and all of which would be a great addition to his library.

By writing to the "Smithsonian," a list of its publications can be obtained, and from these the inquirer can select such as he would like to have.

THE WEATHER BUREAU

Another Department of the Government is the Weather Bureau. This Bureau has been established within the memory of men

who are not yet middle aged. While as yet its full advantages have not been realized by the farmer, they are fully appreciated by our seamen.

In all our sea ports, particularly the large ones, there is a separate Department of the Weather Bureau. The officers in each of these Bureaus send out bulletins available to the captains of ships, telling what the weather conditions are immediately outside the port, and also what they are along the whole coast for hundreds of miles.

These weather signals have without doubt facilitated water commerce and saved many ships from wreck.

As soon as the rural free delivery has extended, it is the intention of the Government to supply all the routes with weather predictions for the next forty-eight hours, and these, without doubt, must prove of the greatest value to the farmer.

It is true that these weather predictions are not always correct, but in the main, they may be depended upon and after the science of meteorology has been perfected, we may hope that the weather predictions will be entirely accurate.

GEOLOGICAL SURVEY

Another very important Department to the farmer is that of the Geological Sur-

vey, which for many years has been examining the surface of the country.

Next to the products obtained from the surface of the soil, we should rank in wealth the minerals obtained from under the soil. These minerals are not simply the metals as many suppose, but also the coal, the limestone, the sandstone, the granite, the gypsum, and a hundred and one things of value which it is not necessary to name here.

This Department has done and is doing an immense amount of good.

We could wish that every reader of this article were interested in this grandest of all subjects. The farmer who has not had time for much scientific study in the struggle for life, will be surprised to learn how interesting is the subject of geology, and if he will write to the Department in Washington, he will be furnished freely with any information that is available.

THE CONGRESSIONAL LIBRARY

The largest library in the United States is housed in a magnificent building in Washington. In this building is gathered the largest collection of books in the Western Hemisphere.

It is not generally known that under the United States Copyright Laws, two copies

of every book published and copyrighted, book or periodical, have to be sent to the Library of Congress.

From this it will be seen what a great flood of books is continually flowing into this wonderful establishment.

Connected with the Library of Congress is what is known as "The Information Bureau."

If there is any subject on which you wish to receive information that cannot be supplied by the Departments we have referred to, the Information Bureau of the Congressional Library will gladly furnish it. It may be well for the reader to keep in mind the sources of information to which we have directed him.

CHAPTER III

THE CENSUS

Purpose of Census—Our Growth—Schools —Agriculture — Statistics — Religious Bodies.

The Constitution requires that a census of the United States shall be taken every ten years. The first census was taken in 1790, or just 120 years ago. At first the President himself supervised the census returns; but, in 1849, the supervision of this important work was transferred to the Department of the Interior. It remained in charge of that department until 1903, when a law was passed creating the Department of Commerce and Labor. By this act the census office was transferred to the supervision of the new Department. By an act, passed in 1902, the Census Office was made a prominent bureau of the Government.

THE PURPOSE OF THE CENSUS

It is generally thought that the chief purpose of the Census is to ascertain the

number of people in the United States, dividing them, of course, according to their ages, sexes, and places of birth. It is true that this is one of the most interesting features of the office, but it by no means limits the field of research.

Census means more than population. It means the growth of manufactures, of farming, of transportation, of education, of religion, and of a hundred and one things which cannot be enumerated here, but which the intelligent reader may learn for himself, by consulting, when published, the report of the Census for the year 1910, which is now being made.

The Census Bureau in Washington employs scores of permanent clerks, in order to secure information as to the continuous growth, as well as to tabulate and put into intelligent shape the information gathered every ten years.

Early last November, in every state of the Union, there was held an examination for a class of temporary public officials, known as " Census-Takers."

The purpose of these Census-Takers was to collect all the information to which we have referred, and to report to a district official, who in turn sent it to Washington.

It will be two or more years before all this information is properly classified and published. The completed reports, it is

thought, will make more than ten volumes. If any of our readers succeeds in getting all the census reports, he will find himself in possession of a library of information, about the growth and development of our country, which will be invaluable.

OUR GROWTH

The Census report, while full of the most interesting information as to our present status, will be found equally valuable in the information it gives as to our competitive growth.

The compilers of the Census in Washington will not only give figures as to our present condition, but they will also show our position in the present Census, as compared with that of 1900, and thus enable us to show the development we have made in the last decade.

By these comparisons, we shall be enabled to see, not only how the population has increased, but, how the birth rate and death rate compare with our natural growth.

INCREASE IN WEALTH

As we all know, the three things essential to the production of wealth are land, labor, and capital. The Census reports of

the past, and the same course will be pursued, but in a more detailed way, by the Census now being prepared, will show in detail how the wealth of the nation has grown.

It is gratifying to know that while our population has been increasing in an unprecedented way, our increasing wealth has more than kept pace with it.

The Census of manufacturing, mining, and quarrying will show the mineral output of all our mines and manufactures, as compared with ten years ago.

OUR SCHOOLS

As a matter of fact our schools may be regarded as manufacturing establishments. This, at first glance, will strike the reader as perhaps a bit startling. But let us consider it:

Our public schools are not established simply to give the child a certain amount of knowledge on certain subjects, though this is certainly necessary. The real purpose is, through the public schools, to train the child in the duties of citizenship; that is, to qualify it to fight its own life battle in the best way, while at the same time, instilling into the mind of the young the duties they owe to the State and to the Nation. The schools are making the citizen of to-morrow.

One of the most interesting features of the coming Census reports will be, as it always has been, the data it gives as to the increase of our school population, and the elevation of educational standards.

AGRICULTURE

While the number of the farm population in the United States is growing smaller, as compared with the number of city and town dwellers, yet, numerically, they are increasing at a great rate.

To all our agricultural readers, the coming Census must be of the greatest interest. It will tell not only of the increased acreage, but also about the improved methods of agriculture. It will show how lands, hitherto comparatively unproductive, have been improved and made self-sustaining through the experimental stations established by the Government, and through the technical knowledge received in our agricultural colleges. This report will show that the days of old farming methods are doomed to pass away and become obsolete, for which let us all be thankful. The man who can make two grains of corn grow where one grew before, is really a public benefactor. The Census report will show that this is being done, and how it is being done.

The breeding of live stock is an important part of every farm.

Data is now being collected showing the number of cattle, horses, pigs, sheep, and poultry now in the United States, and their growth within the past ten years. The present Census report will also show how we have advanced in the matter of dairying, and how we have advanced in poultry raising.

It will, no doubt, surprise some of our readers to know that the last Census report shows that the hay crop of the United States was greater in value than the cotton crop, and that the poultry output in the aggregate was not far inferior in its money value to either one.

FIRE ALARM STATISTICS

The Census Bureau is never idle. It issues bulletins yearly, if not oftener, depending altogether on the information it receives and the importance of that information.

A bulletin, issued two years ago, gave some very interesting information about the number of fire alarms in the different cities of the country.

It should be known that there is established in every city and in most large towns, a fire alarm system, which is under the su-

pervision of the police department. There are certain stations where there is a fire alarm or signal box, which, on being opened and a button pressed, indicates the place of call and shows the district where the fire is. From this bulletin we learn: There are 1,157 different systems of fire alarm in the United States. The wires that carry the fire alarm messages, if extended would be 7,842 miles of single wire. There are 62,504 signal stations or boxes. It is impossible to estimate the amount of property saved through such precaution as this. In considering it we should feel a full measure of gratitude to the men of genius who have invented this means of protecting property.

SOME FIGURES

Among the interesting features given in the last Census report is the fact that the telegraph and telephone wires of the United States, if stretched out in one line, would extend for 1,577,961 miles.

Another fact, to operate these wires and convey messages, requires 28,034 skilled operators, who are paid each year, $17,808,249 in salaries and wages.

To extend and keep in repair this vast machinery requires an expenditure of $41,879,633. The sum earned by these telephone and telegraph companies was $51,-

583,868. Now to earn this they had to transmit 163,794,076 messages. This does not refer to the messages sent by the railroads over their own wires, nor the telephone communications had between people in the same establishment.

RELIGIOUS STATISTICS

No matter how careful the United States Census-Takers may be, it is quite impossible that they should know so much about the growth and present standing of religious organizations as do the men who are at the head of these great bodies. Yet the information given by the Census Bureau is valuable in the way of comparison.

The State Census reports of 1906, of which the Bureau in Washington made a bulletin, show that four years ago there were in the United States 186 religious denominations. There were 212,230 local religious organizations, and 32,936,445 church members. The amount invested in church buildings was $1,257,575,867.

The number of new denominations, or new religious cults established from 1900 to 1906, was 61.

RANK OF RELIGIOUS BODIES

The general order or rank of the princi-

pal religious bodies in 1906, with respect to organization was: Methodists, 64,701 organizations; Baptists, 54,880; Presbyterians, 15,506; Lutherans, 12,703; Roman Catholics, 12,482; Disciples or Christians, 10,942; Protestant Episcopal, 6,845; Congregationalists, 5,713; United Brethren, 4,304; Evangelical Association, 2,758; Reformed, 2,585; Adventists, 2,551; Jewish Congregation, 1,769; Christian Connection, 1,379; German Evangelical Synod, 1,205; Latter-day Saints or Mormons, 1,184; Friends, 1,147; and Dunkers, 1,097.

The Methodist bodies reported more than 30 per cent. of the entire number of organizations. The Baptist numbered nearly 30 per cent. Thus, these two families together embraced about two-thirds of the Christian religious organizations in the United States.

COMPARATIVE GROWTH

Many of the Roman Catholic authorities believe that their communicants are increasing in a greater ratio than those of the Protestant churches. The statistics do not warrant this belief. Four years ago the Catholic congregation, and it should be said that the statistics embrace everyone baptised in the Catholic church, was about 36 1-2 per cent. of all Christian bodies.

Among the Protestant churches, we learn by the same report, that the Methodist bodies rank first in membership, having 17 1-2 per cent. of the total, while the Baptists are within three-tenths of one per cent. of their Methodist brethren.

In the increase of some of the religious bodies, immigration has had a large share. This is especially the case with the Lutheran congregations, recruited from Scandinavia and Germany, and with the Roman Catholics and Greeks, recruited from Ireland, Italy, Greece and Russia.

The Roman Catholics report the highest number of members, 969, for each church organization. This is no doubt due to the fact that in all Catholic churches there are three or four or more services held every Sunday morning for the accommodation of members. For the Protestant churches as a whole, the average number of members per organization was only 104.

MALE ATTENDANTS

From the same bulletin, we learn that the male attendance at all Christian churches in the United States is 43 per cent., as compared with 57 for females.

If we take the Protestant bodies as a whole, the difference is still greater. In these churches the membership is made up

of about thirty-nine men for every sixty-one women.

The largest percentage of males shown for any denomination is that of the Greek Church, which is about 94 men for 6 women. This is, of course, due to the fact that the members of the Greek Church in this country are largely Greeks, and that up to this time very few of them have brought their wives and daughters with them.

It may be well to state, in this connection, that although the number of church attendants, as compared with the total population, has not increased very greatly, the church work is being continued with greater vigor. The number of churches in 1890 was 192,795. There has been a tremendous growth in church buildings of all characters, the Methodists and Baptists leading. Eight new churches, on an average, are being built every day in the year.

CHAPTER IV

PUBLIC LANDS

Available Lands—Dry Farming—Alaska—Farming in Alaska—Conservation

When the writer of this article was a boy, he remembers a song, very popular at the time, which ran something after this fashion:

"Come from every nation,
Come from every way,
Come along, come along, make no delay.
Come along, come along, feel no alarm,
For Uncle Sam is rich enough to give us all a farm."

Uncle Sam is a great deal richer to-day than he was when this song was first sung, but he is in no condition to give more farms to his own children, much less to invite the stranger "from every nation and every way" to come over here and accept a homestead.

The Homestead Law did more, perhaps,

than any other act of Congress to populate our territories and to wipe from the map of the United States what was long known as "the frontier."

AVAILABLE LANDS

The area of what are known as available farming lands, has been gradually limited, until now except in the case of Alaska, it may be said to have vanished.

It is true, there are vast areas of Government land in what is known as "the arid belt." That is the vast district between the Rocky Mountains on the east, and the Sierra Nevadas on the west.

Of course, the best farming land is that in which the rainfall is always sufficient to guarantee good crops. Where this is not the case, irrigation is resorted to and where plenty of water is available, this is perhaps the most certain way of producing large crops.

Along the water courses immediately east of the Rocky Mountains, such as the Valleys of the Missouri, the Platte, the Arkansas, the Republican, the Red River and the Canadian, prosperous farming communities have been established on public lands, while the dryer hinter-lands have been devoted to grazing.

Farms in these locations, where a plen-

tiful supply of water is to be had are worth more per acre than many of the farms in more settled states, particularly in the east.

DRY FARMING

We wish in this book to give information that may be of practical value to the reader. It will no doubt be information to many, as it was to ourselves until recently, to learn that in the arid territory just mentioned, what is known as "dry farming" has been taken up.

It should be well to remember that this immense arid plateau is not in itself infertile. All it wants is water to make it blossom like the garden of the Hesperides. We shall presently speak about the Government work in extending irrigation plants. But the information we wish to call attention to here is that of dry farming.

It is found that in lands not actually arid, that is, lands in which there is some rainfall, say eight or twelve inches—the average throughout the United States is about forty-four—certain crops can be grown successfully. If the reader will write the Agricultural Department at Washington, stating the information wanted, he will receive without charge, a bulletin telling in detail, and with unmistakable clearness, what is being done in the west in the way of dry farming.

On lands, hitherto thought to be irretrievably barren, wheat, corn, tobacco, fruits, and vegetables are now being grown in quantities that pay the farmer for his efforts. Of course, if water could be taken to these places, the crops would be immensely greater, but what we want to point out is, that they are at present sufficiently large to compensate for the labor expended.

There are tens of millions of acres of this arid land, which as yet have not been taken up, but which can be entered on immediately under the original Homestead Act.

Again, we would advise the reader to apply to the Land Office in Washington, for information on this important subject.

ALASKA

When the United States Government purchased Alaska from Russia in 1867, paying for an area of more than five hundred thousand square miles, a little more than seven millions of dollars, this new possession was regarded as an inhospitable waste; a place of perpetual winter, whose only product was furs.

It is not our purpose to speak of the immense forests to be found along the western slopes of the Coast Range Mountains in Alaska, south of latitude 65.

Neither shall we speak of the fisheries now being developed, which are unsurpassed by any others in the world.

Every reader knows of Alaska's fabulous wealth in gold. It is equally rich in coal and iron, and in all the other minerals in daily use; but very few know about the promises this land holds out to the farmer.

If you will consult any general outline map of the Eastern and Western Hemispheres, you will find that a great part of Alaska lies along the same degrees of latitude as do some of the best farming lands in Europe.

The western coasts of all the great continents, particularly north of the equator, are very much warmer than are the eastern coasts in corresponding latitudes. This, as we all know, is due to ocean currents. The western coast of Europe is washed by the Gulf Stream, which carries the waters from tropical regions, and dashes them upon shores that would be cold, barren and inhospitable without their life-giving heat.

There is a corresponding stream in the North Pacific Ocean, known as the "Japanese current." This ocean current is very much larger in volume than the corresponding Gulf Stream. Its waters, of a high temperature, are carried across the North Pacific, and thrown on the shores of Alaska and British Columbia, making those coasts

inhabitable for a farming people, while the corresponding latitudes to the east are represented by Labrador and the realms of perpetual ice.

FARMING IN ALASKA

We have said all this in order to lead up to the subject which we have kept in mind, that is, farming in Alaska, where there are still vast areas of public land to be had, under the Homestead Act.

These lands are naturally very much richer than those of Scotland, Denmark, Norway, and Sweden in corresponding latitudes in Europe.

While Indian corn cannot be grown in Alaska as well as in Illinois, yet in the southern part, it succeeds quite as well as in Maine.

Up to the sixtieth parallel of latitude, wheat and all the fruit of the temperate zone can be grown quite as successfully as in New England, New York, or Pennsylvania.

Still farther north, there are vast areas corresponding to the Highlands of Scotland, in which oats, barley, rye, Irish potatoes, and kindred products can be grown quite as successfully as in any other part of the world.

The hay crop of Alaska, outside of the

forest area, is of course, wild, but the grass is nutritious. It can be readily stored, and it can be cut with as large a product per acre as can be found in those states that make a specialty of timothy and clover.

To the farmer who feels that he has been crowded out of the more settled states, or whose land has become exhausted, and who still desires to live under the Stars and Stripes, we would recommend Alaska. But whether our counsel be taken or not, we should by all means advise him again to write for information on this subject to the Land Office in Washington. We may add that immediately north of the American line, and east of the great mountain ranges, there are still immense areas of unoccupied public lands, the greater part suitable for cultivation, and open to settlers in the Dominion of Canada. Don't be afraid of Canada, it is a grand and a growing country, in which live our well-beloved kinsmen, under conditions that make for all that is best in life.

CONSERVATION

Uncle Sam would still have had farms to give away, if he had continued throwing away his gifts with his old-time extravagance.

It is only of late years that we have come

to appreciate that, no matter who may own the individual farm or lot, the collective lots and farms go to comprise our country, the United States.

While the farms and lots are owned in what is called "fee simple"—and this is the highest title one can have in land—yet no man can alienate his land. That is, he cannot transfer it to another Government, nor can he do with it as he pleases. He holds his land subject to the right of eminent domain, and if the Government, state or nation requires that land or that lot for public use, it can be taken, due compensation of course, being paid. Again, to hold it he must pay for the privilege in the way of taxes.

The denudation of our mountains, the source of our rivers, by private owners who cut the timber into lumber or used it for the manufacture of paper, or other articles of merchandise, it was discovered, was working great harm to all the people living in the adjacent valleys.

It was found out that the rainfall had lessened by the destruction of these forests, and that when the snow melted in the spring, it melted suddenly, as was inevitable where there was no protection from the shade of the trees. The consequence was the sudden rise of the streams and rivers, followed by destructive floods.

In addition to this, forest fires destroyed vast areas of timber under individual control, and these trees so essential to the welfare of the general public, were being destroyed by unthinking men for immediate gain. In the older states, neither the State nor the National Government could come in and direct the owners of these lands what to do; but where the states were not so old, the State and the Nation had retained the right to withdraw them from settlement and to conserve lands for the benefit of the whole people.

In this way the United States Government withdrew from settlement millions of acres of forest and plain lands, and converted them into public parks.

NATIONAL PARKS

The National parks of the United States, at this time, cover an area of 3,654,169 acres. The more important of the National parks are: The Yellowstone National Park, which is located in Wyoming and Montana; the Sequoia National Park, General Grant National Park, and Yosemite National Park, the last three being in California; Mount Rainier National Park in the State of Washington, and Crater Lake National Park, in Oregon.

The reservation known as Yellowtsone

National Park was established in 1872. It covers a tract 65 miles in length from north to south, by about 55 miles in width from east to west.

This gives an area of 3,312 square miles, which is nearly that of the states of Rhode Island and Delaware combined.

The Rocky Mountain chain crosses the south-western portion of this park, leaving by far the greater expanse on what is known as the Atlantic slope of the mountains.

This wonderful park has mountains varying in elevation from six to eleven thousand feet. It is traversed by many picturesque valleys, through which run clear streams fed from the mountain snow peaks, or by wonderful springs. Many of these springs are cold, crystal water, while others, like the Mammoth Hot Springs, are of a boiling temperature. There are geysers in Yellowstone Park unsurpassed by any in the world, while the caves and grottoes of this wonderful place are a source of instruction and amazement to an ever-increasing number of tourists.

If you would learn of our immense and ever-increasing forests preserves we would advise you to write to the Department of the Interior in Washington, whose information will be supplied promptly and without cost.

CHAPTER V

INTERSTATE COMMERCE

Purpose of the Commission—Railroads—Freight Regulations.

The debt of the general public to the Interstate Commerce Commission is probably not generally realized. Organized in 1887 it has become a well nigh indispensible feature of our judicial system. It has rendered thousands of decisions upon great economic questions, and dealt thoroughly and exhaustively with the vastly complicated problem of transportation in America. Its decisions affect more or less directly the poorest as well as the wealthiest citizen.

One of its chief services, which is generally overlooked, is in collecting, testing and certifying to commercial information. This immense labor is at the disposal of all. Its work is encyclopedic. It has placed at the disposal of the public the most widely distributed, the most exact and best authenticated collection of facts relating to railroading in America which is now available. No matter if one's business be large or

small there is certain to be much information in this great collection relating directly to one's interests. The farmer or the great manufacturer is equally indebted to the Commission. Many merchants still fail to realize the value of the information which is thus placed at their disposal and do not take advantage of it. As the work of the Commission is better understood and appreciated its value to the average citizen will be increased.

WORK BEING DONE

Any man with a grievance against the great carriers of freight receives intelligent and instant attention from the Commission. Their attention has been directed for instance to the illegal use of private cars. Such a practice works a great injustice to the shipper who is compelled to use the regular vehicles. The situation was thoroughly investigated and legislation to prevent its recurrence and punishing the offenders was enacted. The work of the Commission in doing away with rebates is still fresh in the public mind. Here again the evil was thoroughly exposed and drastic legislation passed and enforced.

The practice once comparatively common allowing discounts to particular shippers, has been driven out of American railroad-

ing as the result of another complaint. To-day the law rigidly forbids such favoritism under severe punishment. Still another form of discrimination consisted in granting special rates to favor one shipper as against others. The Interstate Commission went into the problem exhaustively, spending months and in some cases years in collecting evidence.

COMPLAINTS

Much complaint was heard a few years ago against the practice of directing traffic arbitrarily. The farmer, for instance, would lose his crops by the failure of the railroads to transport them within a reasonable time to the markets. The law protects him at present, and the smallest dealer may demand and receive the same treatment as the largest shipper. To illustrate how carefully the interests of the shipper have been guarded we may cite the ruling of the Commission against a railroad granting exclusive station facilities to one shipper to the inconvenience of others.

If the reader suffers from any such inconvenience he must see that he is amply protected under the law. The question of rates is important. The Commission requires that all rates be fixed in inverse ratio to the natural advantages of the com-

peting towns. Each community, it will be seen, is entitled to and receives the benefits arising from its natural advantages. A city which is near a seaport for instance must be granted rates depending upon the distance. Without such a law the railroad might very well increase the rates arbitrarily, merely because the town in question must ship its freight to the seaport at any price.

SMALL SHIPPER

The smaller shipper is insured the same rates and privileges accorded to the most powerful shipper. No matter what the social, political or business strength of his rival, he is insured against discrimination. No special privileges are granted. Without this restriction a powerful merchant might very well enlist the services of the railroads to crush his rival. The public has been gradually educated to realize the strength of the position of the small shipper. Information concerning the interstate laws should be familiar to every business man. He never knows when he will be required to take advantage of it.

No individual need suffer from the railroad creating different market conditions, which it is obviously in its power to do. The rates you pay, must bear a reasonable relation to the cost of the freight itself.

The Commission has rendered many important decisions upon what constitutes a reasonable rate and what is a discriminating rate. An immense amount of data has been collected bearing on the subject which is at the disposal of the shipper.

The Commission insists on the general principal that transportation is a competitive industry and must be kept so. Fixed ratios of charge are arranged for the protection of the shipper. It is meanwhile fair to both parties and the railroad is amply protected. Take for instance the relation of freight rates and water competition. It is the object of the Commission not to extinguish competitive water routes. On the other hand, if the water route parallels the railroad and enables a dangerous competition to arise, the law is waived in that section and the railroad is permitted to adjust its rates to meet the local situation.

Under the law a railroad becomes an interstate carrier when it voluntarily enters into a through shipping agreement. Shipping from within a state, without intention of shipping beyond the state is not interstate commerce. Through rates again are a matter of agreement among the carriers engaged in interstate commerce. The Commission has no power to compel railroads to enter into agreements without their consent.

CHAPTER VI.

POSTAL SAVINGS BANKS

What They Are—Protecting the Money—The Government Pledge—The Interest Feature.

In the same book savings banks have been treated at some length and their great advantages to small investors pointed out.

In some European countries, and particularly in Great Britain, Postal Savings Banks have been established for many years, and they have been found of very great advantage to people living at a distance from the usual saving banks.

It is unnecessary to state that the Postal Savings Bank is quite as much a Government institution as the Post Office itself, and that it is quite as safe as the United States Treasury.

In a recent issue of the *Christian Herald*, there appeared an able article on this subject, which we offer no excuse for giving in full in this chapter.

"The Postal Savings Bank bill, which for so many years has been advocated by

various postmasters-general, has at last become a law, and as soon as it has been put generally in operation, it will be possible for people of even the smallest means, living in the most remote districts, to invest their savings in what practically amounts to government securities. It is one of the most important measures yet passed by Congress, and it is expected to have a compelling effect not only as an incentive towards general saving, but also in the matter of drawing into general circulation much money which is now being hoarded in out-of-the-way places.

For thirty years efforts have been made to establish a governmental banking system more or less similar to the one covered by the present law, and some remarkable contests have been waged for and against the advisability of its adoption. However, it is now a law, and we shall presently be able to judge from its practical working just how beneficial it will prove to be. There seems to be no doubt that it will prove to be a potent agent in inducing the poor classes to save.

The idea is to open a banking department in the various post offices, particularly in remote districts where banking facilities are now lacking. Under the new law anybody over ten years of age will be able to open an account in one of these postal

banks. No deposit of less than one dollar will be received, but each postmaster will be authorized to sell special ten-cent stamps which may later be turned in after ten have been collected and a credit of one dollar received by the depositor on his account. Thus it will be possible for a poor person to begin saving with one dime and keep increasing this until one dollar has been accumulated in stamps, when he or she may open an account with the United States government. No one will be allowed to deposit more than $100 during any calendar month and no single account will be permitted to exceed $500. The government will pay 2 per cent. interest on all deposits."

The money collected by the various post offices in this manner will be deposited in State and national banks named under the new law as depositories of postal savings funds. These banks will be required to put up public securities (State, county and municipal bonds) as security for the deposits.

PROTECTING THE MONEY

One of the main points of opposition to the postal savings banks has been the above authorization to invest the deposits in government securities, but it is now acknowledged that these deposits will help the government solve the problem of issu-

ing the new Panama bonds. These bonds were authorized, but have not been issued. It has been generally conceded that they would have to pay an interest rate of at least 2½ per cent., and to attempt to float them at this rate would have had the effect of sending the seven hundred million of government 2 per cent. bonds now held by the National banks probably below par. On account of this probability the government has refrained from issuing the new bonds and in the meantime has been hard pressed to finance the Panama Canal construction expenditures out of its working balance. However, under the new law the government will be able to invest in these 2½ per cent. bonds and reimburse the United States treasury and its Panama expenditures without disturbing the now outstanding 2 per cent. bonds.

All funds acquired by postal banks will be under the supervision of trustees composed of the postmaster-general, the attorney-general and the secretary of the treasury. These trustees will decide what post offices shall be authorized to receive deposits, and all postal banks and depositories will be under their direct control.

Pass books will be issued to depositors just as by any savings bank and the withdrawal of funds will be permitted at any time. Five per cent. of the total deposits

will be held by the Treasurer of the United States as a reserve to guarantee the payment of depositors and for a provision authorizing the withdrawal of 30 per cent. of the deposits for investment in government bonds, and the depositors are also to be permitted to transform their deposits into bonds when they so desire.

THE GOVERNMENT PLEDGE

To establish the first of the postal savings banks $100,000 is appropriated and it is declared expressly in the bill that "the faith of the United States is solemnly pledged to the payment of the deposits made in postal savings depository offices with approved interest thereon as herein provided."

It will be interesting to observe the working out of this postal savings system. That it will do immense good in inducing the poor classes to save money there can be no doubt. The ability to purchase stamps at ten cents apiece and have them credited to one's self in the form of a bank account backed by the personal word of Uncle Sam is without doubt so alluring that many people will be induced to save money in this way who never saved money before in their lives. Saving is, after all, merely a habit, and once it is thoroughly acquired, it is

probably as hard to break as any other habit.

For those people who could not be induced to save in any other manner, the system will without doubt be of great benefit, but for those who have already acquired the saving habit, it is a question whether the government postal banks system will prove an advantage. Persons of this class have already been taking advantage of private systems of thrift which embody as much of a sense of security as that offered by the government and which at the same time provide a greater reward for the saver; that is to say, higher interest.

THE INTEREST FEATURE

It will be remembered that in a previous article we commented at some length on the low interest bearing feature of government bonds, and as the interest rate offered by the postal savings banks is quite as low as that which it has been recently possible to obtain on government bonds, the same objection may apply. The government will not permit more than $500 to be deposited in any one postal bank account. What then is the depositor to do with his $500 after the limit has been eached? Is it probable that he would be content to earn but 2 per cent., or ten dollars a year, on such an

amount of money when it will be easily possible to invest it in safe securities and earn more? Would he be content even to wait until he had deposited $500 before he would withdraw the money and invest it in some of those higher interest bearing securities?

In these days of competition, even bond houses offer inducements to the small investor to purchase securities piecemeal, that is, in small amounts at a time, and the man or woman who has got into the habit of saving towards the possible rainy day or towards the peaceable old age must make shift to have his or her money accumulate as speedily as possible.

As we stated in a former article, "the cost of living has increased so much in recent years that it has become a matter of necessity for people to earn more than they did formerly, and for the same reason money must be made to earn more than it did in previous years. How to do this safely is, of course, the problem." Still it is undoubtedly true that there are many safe investments which will yield a greater profit than the 2 per cent. which it is proposed to pay for money deposited in postal savings banks.

CHAPTER VII

LABOR, LAWS AND WAGES

Restrictive Laws—Better Conditions—As to Wages.

The attitude of the law towards labor has undergone a complete revolution within the past few decades. Within the memory of men still living laws were enacted to forbid combinations of workingmen. To-day in several states the law compels municipal work to be performed only by union men. There have been many contradictory rulings from the bench regarding labor, but the general tendency has been towards insuring the largest possible measure of freedom to labor.

The laws of all the states at present allow the organization of labor unions. The Federal statutes, and the laws of ten states, go even further, and permit the incorporation of trade unions. One state, Nebraska, carries this still further and allows the unions to be incorporated automatically on

the receipt of their charters. Few labor unions have taken advantage of this opportunity to incorporate. The states of New York and New Jersey permit the incorporation of labor unions for specific purposes. It is significant to find many states enforcing laws against the incorporation of trusts while discriminating in favor of labor unions that desire incorporation.

RESTRICTION LAWS

There has been considerable legislation to restrain employers from discriminating against union men. The law in this respect differs widely in the several states. In Minnesota the law severely punishes an employer who discharges an employee for striking, and he is also restrained from bringing influence to black list him in other places. In Illinois, Washington, Oregon and Tennessee, the law expressly forbids an employer from advertising for workmen to fill the positions of strikers, unless he announces that a strike is in progress. This legislation is in striking contrast to the indiscriminate use of the black list which was comparatively common a few years ago.

Much of this legislation is, of course, directed against the black list methods and it would seem that the old practice is well

nigh impossible to-day in a majority of the states. In Wisconsin an employer is forbidden by law to furnish employers of labor with lists of striking employees. As a general rule legislation throughout the West is more favorable to the workingman than in the East or South. In Nevada the law requires all public printing to bear the union label.

In New York and some other eastern states, the unions are forbidden to discriminate against men who join the national guard. In many states boycotting is prohibited as well as picketing. Many laws have been passed throughout the country touching on arbitration. It has been made binding on both sides in labor disputes to observe the findings of boards of arbitration for a fixed time in Colorado, Idaho, Indiana, and Illinois.

Both sides in labor disputes meanwhile are cautious about introducing legislation looking to making arbitration compulsory. Attempts to pass such laws in a number of widely separated states have met with unexpected opposition. The employer is fearful of such laws as a rule, since they may place his business affairs at the mercy of arbitration boards which, though fair-minded and well-meaning, are ignorant of business conditions. The labor unions on the other hand fear that compulsory arbi-

tration would place them at the mercy of boards in sympathy with employers and interfere with their personal liberty. At present the legislative outlook does not promise the enactment of compulsory legislation.

BETTER CONDITIONS

The general tendency of the law to permit greater freedom to union men in their conflicts with capital, has received a significant reversal recently in New York by a decision, forbidding them from picketing or otherwise influencing such as would take the positions left vacant by the strikers.

Within the past few years many groups of employers have formed themselves into powerful organizations with the avowed purpose, not of influencing prices or controlling the market, but solely to combat the power of the labor unions. There seems to be a tendency throughout the country for the employers and employees to organize to protect their interests. On the other hand the past year has been singularly free from serious strikes, with a few notable exceptions in smaller cities. All things considered, labor enjoys greater liberty under the law to-day than ever before in the history of the country.

The wages both of skilled and unskilled labor have increased steadily in past years.

The Government statistics, for a period of eighty years, show a gradual increase as regards the labor market as a whole. There have been years when the increase was arrested and has even retrograded, but the upward movement has been practically uninterrupted in the past twenty years. In 1830, for instance, the wages of a common laborer was $1.00 a day. Then years later the average had dropped to 87 cents, in another ten years it had risen to 92 cents and another decade or by 1860 it had risen to $1.03, which marked the high water mark up to that period. In the next ten years the wage advanced to $1.48, but by 1880 it had fallen to $1.31. Since then it has risen and is, at the present time, taking the country as a whole, about $1.50. The labor unions have greatly assisted this advance, especially in late years, and meanwhile the hours for labor have been shortened from ten, twelve and even fourteen hours per day in the early decades of the last century, to eight or ten hours at present, with the promise of a still further reduction in the future.

The wages of miners, contrary to the general impression, shows steady and practically uninterrupted increase throughout the past seventy years, for which statistics are available. In 1840 the average daily wage was but 80 cents a day. It rose ten

years later to 85 cents and in another decade or in 1860 to $1.03. Ten years later in 1870 it had risen to $1.90, which marked the highest point. By 1880 it had fallen to $1.50, then in the following decade it rose to $1.60 and in another ten years to $1.78 and later approached $2.00.

In the trades where labor is better organized into protective associations of various kinds, the increase in wages has been more striking. To-day the union wages which generally speaking prevail are doubtless the highest paid for such labor in any country in the world. The hours of work have meanwhile been steadily decreased. To-day the great majority of the trades work on the eight hour schedule and the seven hour day seems to be a possibility of to-morrow. Favored by liberal laws in a great majority of the states, the unions are completely organized and many of them may be counted wealthy. In many states the labor party has a recognized following which is an important factor in the political situation, as witness the immense amount of legislation favorable to labor which is every year carried in the various state legislatures.

The official Government statistics on the wages of skilled labor are full of surprises. The wages are classified according to the general divisions of the country. The

wages in the states of the North Atlantic group are so similar that they are averaged. The same plan is followed in indicating the wages in the South Atlantic states. The other general geographical divisions are the North Central, the South Central and the Western states. No single section or group of states has a monopoly either of low or high wages. The advantage seems to be decidedly with some sections for certain groups of trades, while other workmen would seem to be much better off in others. These figures will doubtless prove of great practical value to the public in indicating the most favorable localities for plying a particular trade.

A bricklayer for instance receives fifty per cent. more for his services in the Western states than in the North Atlantic states. He is most poorly paid in the South, while the North Central and South Central states are midway between these extremes. The wages of a blacksmith in curious contrast is about equally paid throughout the country with a very slight advantage in the West. On the other hand, the workers in lumber are better paid in the East than in the West. A baker is better paid in the West than any other section of the country while a foundryman or machinist is better off in the South. The printer is about equally paid in all localities. The

following statistics which are typical of the various trades will doubtless prove valuable as a reference page.

WAGES

Bakers	Per hour
North Atlantic	.28
South Atlantic	.23
North Central	.25
Western	.36

Blacksmiths	Per hour
North Atlantic	.25
South Atlantic	.22
North Central	.23
South Central	.25
Western	.30

Bricklayers	
North Atlantic	.53
South Atlantic	.44
North Central	.57
South Central	.59
Western	.70

Foundries and Machine Shops	
North Atlantic	.25
South Atlantic	.30
Western Atlantic	.25

Iron and Steel Workers	
North Atlantic	.40
South Atlantic	.24
North Central	.65
South Central	.14

Lumber	
North Atlantic	.45
South Atlantic	.25
South Central	20
Western	.24

Printing	
North Atlantic	.33
South Atlantic	.23
North Central	.31
South Central	.33
Western	.34

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CHAPTER VIII

FARM MANURES

Variable Manures — Use of Manures — Plant Variations—Good Farms—Learn Plant Needs.

It is only within the past generation that farmers have come to look upon their land in much the same way that they do upon their live stock.

Farmers have always fed their cattle, and given their draught animals a rest, and this, because the animals were living, moving things that ate, and drank and slept, and so in a way resembled their owner in their wants.

But the land was an entirely different matter. It was immaterial. It was unconscious. It had no soul, and so it was reasoned, it had no wants. The world is growing stronger and better, not so much by the increased number of the people living in it, as by their increased knowledge.

We have discovered that we cannot con-

tinually take out, even from an inanimate thing, something, forever, and never put anything in.

We have come to realize that the land, if we would have it produce, must be fed the proper food, exactly as we feed animals. And so, too, we have come to understand that there are circumstances under which the land needs rest, exactly as does the owner, or the animals that he works.

The discovery of this fact has been one of the most important in agriculture.

Long before the men of our race had their eyes opened to the fact that the land must be fed, the Chinese and Japanese, who in our lordly superiority, we have been inclined to regard as inferiors, have understood this subject, and acted upon it.

The writer of this article has seen in China the coolie, or farm laborer, following for hours a wagon drawn by horses, in order to collect their droppings for manure. In that land nothing that will tend to feed the plant is allowed to go to waste. They gather the sea-weed thrown upon the shores and after subjecting it to fermentation, use it as manure.

All the offal and excrement of animals and human beings are gathered, and after being properly treated are used as a fertilizer.

The result of this great care is that China

and Japan have been able to sustain their teeming population on lands which in the United States might be regarded as hardly worth purchasing or working.

VARIABLE MANURE

Formerly all substances which were spread upon the land for the purpose of enriching it were called manures. Of late, the meaning of the word has changed, and it does not now embrace the commercial fertilizers, or those substances whose chief object it is to improve the physical condition of the soil.

The term manure is now applied to the excrements of domestic animals, mixed or unmixed with vegetable or other refuse material, and a few other substances. Only in rare cases are amendments, or extraneous matters, or fertilizers mixed with them in sufficient quantities to change in any marked way the character of their constituents.

The term excrements has been substituted for the ancient word "dung," the meaning of which was somewhat ambiguous.

Excrements are the solid and liquid voidings of animals unmixed with litter.

The term "barn manures" has been substituted, in some cases, for "farmyard manures," which are cared for and sheltered

until they are taken to the field, from those which are left to depreciate in quantity and value, by being exposed in the farmyard to the action of rain and heat.

Farm manures is a generic term, and includes all kinds and classes of refuse matter, whether applied chiefly as an amendment, or for the plant-food contained, or for forming a mulch, or for all three purposes combined.

The excrements associated with bedding or other material from the different species of animals, when thrown together, are called "mixtures," while those from a single species are called by the name of the kind of animals which produce them.

THE USES OF MANURES

Most manures are unbalanced; that is, they contain a relatively high percentage of nitrogen, and a low percentage of phosphoric acid and potash.

It is not generally known by farmers, but it should be, that leguminous plants produce nitrogen. By leguminous plants should be understood peas, beans, and kindred varieties.

It is believed that in the greater part of the arable portion of the United States, east of the dry belt, enough nitrogen from leguminous plants is secured, where planted,

to provide enough for two or more subsequent crops.

ADAPTABILITY

If plants are not well adapted to the soil and climate, they are unable to utilize the food which is present, and tend to languish, although there may be not only a sufficient plant ration, but also a well-balanced one.

In basing the wants of plants on chemical analysis and in making comparisons between them and the composition of manures, there is danger of being led into false conclusions.

It is next to impossible to determine by the analysis of soil and plant, how much and what plant food should be added to secure the best results.

Then, too, plants raised for a long time under superior conditions of plant food, soil and climate, acquire powers not possessed by the same species grown from time to time under adverse conditions.

Not only may plants, like animals, acquire new qualities and increase those already possessed, but they may also, in time, under favorable conditions, become so fixed in their acquired powers that these characters may be transmitted with a good degree of certainty; that is, they may become thorough-bred in the best sense of the word.

PLANT VARIATIONS

Plants vary greatly in their root systems, and leaf structure, and hence, in their power to secure the necessary elements from the soil, and from the atmosphere.

Some plants thrive best with a minimum, others with a maximum amount of moisture; some do best in poor soils, and others will thrive only when there is an abundance of easily available food.

It is very difficult to feed plants properly, and the man who can do so with success, may be considered an expert if not a wizard.

Notwithstanding all this, if the investigator begins to question the soil with a knowledge of the composition of the crops to be raised, and the manures applied, he is far more likely to obtain true answers to his questions, than if he were to trust entirely to science on the one hand, or to visible external results on the other.

GOOD FARMS

Most good farms are kept in a productive condition by the aid of rotation and manures, with an occasional light application of commercial fertilizers to the cereals.

Very few farmers appreciate the importance of liquid manure, indeed too many

farmers allow the wealth of their lands to be carried away by the rains. Dry manure may have some value, but it is very little, its strength has been carried away by rain, or it has evaporated. The construction of a proper receptacle for liquid manures is more important to the farm than is a cellar for roots, or a barn for hay.

The farmer who best understands this and acts upon it, is sure to have the best crops, and the biggest returns for his labor.

THE GOOD DUNG

While farm manures are always valuable in improving the condition of the land and increasing its power to hold moisture, they contribute only one factor, and this is a very small one, in determining the quality, quantity, and value of a crop.

The true value of farm manures depends not only on the composition, but quite as much on the ability of the farmer to associate their factors with them, which, taken together lead to the best success.

It is a fact that most soils, even those thought to be exhausted, contain a surplus of plant food, over and above the wants of the crop in any one season, yet the question of highest economic results, as between tillage and added plant food, can be determined only by experiment.

Increased tillage, and the application of farm manures and other forms of plant food, may largely fail of their object, if the plants grown are not suitable to the climate, or have not the inbred power to make the best use of their improved environments.

KNOW THE KIND OF PLANT.

A knowledge of the composition of the plants sometimes gives no indication of what plant food should be added to the land to secure the best results; for example, clover contains a high percentage of potential nitrogen, yet it thrives well on land deficient in nitrogen.

An ordinary analysis of soil gives little indication as to the availability of the elements which it contains.

Having mastered the sciences which underlie agriculture, and having learned how to apply them to the growth of one or more kinds of plants in any particular locality, and how to make soil fertile, and how to select and apply fertilizers and manures, still all this knowledge may be of little value if the one great factor of moisture is lost sight of.

All home resources of fertility should be fully utilized, before resort is had to purchased ground food, in the way of commercial fertilizers.

MORE ABOUT MANURES

Manures vary greatly in their chemical composition, and also in their beneficial effects. These variations are due to many causes.

Young animals digest their food more closely than do old ones. Very young animals are usually fed on milk, all of which is believed to be digestible, while the constituents of the food of mature animals are never wholly digested or assimilated.

In the young growing animal all of the constituents of its food are wanted for growth and development, while the mature one has its structure fully completed, and requires food only for maintenance and for surplus product, as increasing weight or the production of milk.

As the digestive and assimilative powers are more active in the young than in the old animals, the excrements of the former contain less of the manurial found in the food consumed, than those of the latter. Young animals change vegetable into animal products more economically than old ones, and hence, they are likely to give more pounds increase in weight for a given number of units of foods, but the resulting excrements are less valuable than those from mature animals.

Mature animals which are non-productive, and are not increasing in weight, return, sooner or later, nearly all the mineral constituents of their food in their excrements, while only one-half to two-thirds is returned by the young and rapidly growing ones.

Cows in milk return in their excrements only about 65 to 75 per cent. while fattening animals return 85 to 95 per cent. of the fertilizing elements of their food.

CHAPTER IX

CORN

Small Yields—Ripening Time—Best Seed Corn—Care of Seed—Late Maturing Plants.

REASON FOR SMALL YIELDS

The average production of corn, for the entire United States is but 26 bushels, where in practically every section four times that quantity is frequently planted. The improvement of the quality of seed is the least expensive method of increasing the yield.

The selection of the very best seed by the farmer is something that his father, and most certainly his grandfather, never considered. In the old days the usual method of collecting the seed corn was to take the first ear that came to hand, shell it, and use the grains, little or big, to plant the hill or place in the furrow.

Potato and, indeed, every other seed, was used in the same way, wholly forget-

ting the fact, if indeed it were ever thought of, that "like begets like."

There is in the spring a scarcity of good seed corn. There is no reason for this, and it is a sad state of affairs in that it induces a tremendous loss to the country at large and may spell ruin to the farmer. A full stand may be obtained from this inferior seed and this stuff may do for fodder, but that is not what you plant it for. This loss is due to negligence, possibly on your own part. The best time to secure seed corn is in the fall or late autumn. It is too late to wait until spring, for the chances are that good seed will not then be available.

RIPENING TIME

Autumn is the very best time to prepare for a good crop in the following year. That is the time when the best seed is most abundant and when it can be judged to the best advantage. That is the time when it possesses all its vitality, but many let this opportunity pass, expecting to buy their seed corn from some more careful neighbor, and never thinking of it again until spring when the chance of purchase may be gone.

BEST SEED CORN

Until a community has its experienced

and honest corn breeder, the best place for the farmer to obtain seed corn is either from his own fields or in the immediate neighborhood, where the grain is of a variety with which he is familiar.

Well conducted corn breeding requires special methods that most farmers have not time to apply. If there is a corn breeder in your locality, who has demonstrated the superiority of his own corn, you should be willing to pay his price for the superior seeds that he makes available for his neighbors, $5.00 a bushel will be a profitable bargain for both parties if you can get the right kind of seed corn. Such corn breeders are improving corn as other breeders are improving cattle.

The general farmer, which may mean yourself, is a propagator rather than a breeder of corn. He profits by the careful work of the breeder by adopting higher yielding strains and continuing them.

WHAT IS GOOD SEED CORN

Too many people consider corn good simply because it will grow. First class corn must be:

First: Well adapted to the seasonal and soil conditions where it is to be planted.

Second: It should be grown on a productive place and of a productive variety.

Third: Well matured and preserved from ripening time until planting time, in a manner that will preserve its full vitality and vigor.

The importance of the three requirements just named has been demonstrated experimentally by the "Office of Corn Investigation" of the "Bureau of Plant Industry," the results of which are briefly enumerated as follows:

1. For a number of years 12 well-bred varieties were tested in 12 Northern States, an equivalent lot of seed being used in each State. The varieties that produced the most in some States were the poorest in others.

2. Seed ears taken from the highest yielding rows of ear-to-row breeding plants have repeatedly produced better than seed ears taken from the poor yielding rows.

Seed corn from the best producing stalks found in the large field produce more than seed ears taken without considering the productiveness of the parent stalks.

3. Four bushels of ears were divided into two equal parts, one part being well taken care of, and the other being placed in the barn, as corn is ordinarily cribbed. The well preserved corn had an increase of 12% in productiveness on poor soil and 27% increase on fertile soil, notwithstand-

ing the fact that both lots of seed germinated equally well.

GATHERING SEED CORN

If you want good seed corn produce it yourself. At the proper time drop all other business and select an abundance of seed corn. The process should not be conducted incidentally while husking but should be given your entire attention.

Get the very best that is to be had; if this is to be had on your own farm, preserve it well. Your increased yields will return greater profits than any work you may do on your farm, that is, if you make a feature of raising corn.

The right way to select seed corn is from the stalks standing where they grow, just as soon as ripe and before the first hard freeze.

PROPAGATING FROM THE BEST PRODUCING PLANTS

As soon as the crop ripens, go through the fields with seed picking bags and husk the ears from the stalks that have produced the most corn without having had special advantages, such as space, moisture or fertility. Avoid the large ears on stalks standing singly with an unusual amount of

space around them. Preference should be given to the plants that have produced most heavily in competition with a full stand of less productive plants. In all localities the inherent tendency of the plant to produce heavily of sun-dry, shelled corn is of most importance.

LATE MATURING PLANTS

Ears that are heavy, caused by an excessive amount of sap, should be ignored. Sappiness greatly increases the weight but is likely to destroy the quality. In the Central and Southern States, all other things being equal, short, thick stalks are preferable. The short stalks are not so easily blown down. The thick stalks are not easily broken and, in general, are more productive than slender ones. The tendency for corn to produce "suckers" is hereditary; other things being equal, the seed should be taken from the stalks that have no suckers.

TREATMENT OF SEED

The same day that seed corn is gathered, the husked ears should be put in a dry place where there is a free circulation of air and arranged in such a manner that the ears do not touch one another. This is the

only safe way. Good seed corn has often been ruined because it was thought to be dry enough when gathered and that the precaution of keeping the ears separated was not necessary. Many farmers believe that their autumns are so dry that special care is nonsense. Seed corn in any locality, gathered in ripening time, will be benefited by drying as we have suggested. If left in the husk long after ripening, it may sprout or mildew during warm or wet weather and also may become infested with weevils.

The vitality of good seed is often reduced by leaving it in sacks or in piles for even a day after gathering. During warm weather, with some moisture in cobs or kernels, the ears heat and mildew in a very short time.

A very good plan is to pass a cord or twine through the seed ears, keeping them at such distances apart that they will not come into contact with each other, and then suspend them in some dry place where the temperature is moderately even.

DESTROYING INSECTS

If at any time signs of the weevil or gray moth begin to show on the seed corn, it should be enclosed in a bin with carbon bisulphide which can be bought at the drug

stores, and kept practically air-tight for 48 hours. The bi-sulphide should be placed in shallow dishes or pans and placed on top of the seed. A half pint is sufficient for a box or barrel holding ten bushels. After fumigation the ears must be thoroughly aired, taking care that no fire is present when the fumigating box is opened.

WINTER STORAGE

After being carefully cared for for two months, the seed ears should be as "dry as a bone," and contain less than 10% of moisture. They can remain where they are dry, or may be stored in mouseproof boxes or barrels during the winter, but in any case, they must not be exposed to a damp atmosphere or where there is moisture, or the seed will be injured.

Some farmers place the thoroughly dried seed ears in the center of their wheat bins, covering them with the loose, dry wheat. In localities where the weevil and gray moths are to be found, all grains and seed ears should be stored in very tight receptacles, with one pound of moth balls, or naphthalene balls, enclosed with every bushel of corn. This quantity, tightly packed with the corn, will prevent damage from this insect, and at the same time not hurt the seed. It costs about 3 cents a

pound, and 30 cents' worth will protect enough seed to plant 60 acres.

GERMINATING SEED CORN

Seed corn that has matured normally and has been properly preserved will grow satisfactorily. It is very poor economy to neglect proper preservation, and then spend time in the spring separating by germinating tests those ears that have been badly damaged from those that have been but slightly injured. Prevention is better than cure, and in this case a cure is impossible. Ears slightly damaged by poor preservation may germinate well but will produce less than those that have received better care.

TO MAKE A SEED-CORN TESTING BOX

To test 100 ears of corn separately, take one grain from each ear. Be sure that each kernel tested is perfect in appearance and not injured at the tip when removed from the ear. If three or more kernels out of each ear fail to grow, it would be advisable to test every ear in the entire supply of seed corn. If in the 100 ears tested there are no poor ones, further testing of the supply is not necessary.

GRADING SEED CORN

Shelled corn is difficult to grade satis-

factorily. Grading can be done better before the ears are shelled. If the seed ears vary greatly, they should be separated in two or three grades, according to the size of the kernels. These grades should be shelled separately, tested in the corn planter, and numbered to correspond with the numbers on the planter plates that are found to drop them most uniformly. This arrangement can be completed before the rush of spring work sets in.

METHOD OF SHELLING

The first operation in the proper shelling of seed corn is the removal of the small kernels from the big ones, the round or thick ones from the butts. The former are less productive than other kernels in the ear. The butt kernels are as productive as the other kernels of the ear, but do not plant as uniformly in the plates.

HAND SHELLING THE BEST

Shelling seed corn carefully by hand is preferable to other methods. Into the shallow pan or box each ear should be shelled separately, rejecting any worm-eaten or blemished kernels. If the supply from each ear appears to be good and contains no poor kernels, it should be poured

into the larger supply and another ear shelled in the same way.

IN CONCLUSION

If you have ever found yourself compelled to plant corn that was not fit for seed, you learned enough not to do it again. It is too discouraging to begin the season with a poor crop prospect. Get your seed at ripening time, when the best quality is most plentiful. Get an abundance, enough for planting again what the high water may destroy, and also sufficient to supply some farmer who may have moved into your community recently, or a neighbor who did not select his seed corn at the proper time, or in the proper way.

Save the seed from only the most profitable plants, with the same care you use in propagating your animals, caring for each living kernel from the time it ripens until it is planted, in a manner that will enable it to develop into a thrifty plant producing one or more large ears.

Shell your seed corn carefully by hand!

CHAPTER X

FACTORS IN CROP PRODUCTION

Seed—Selection—Home of the Plant—Temperature—Light and Moisture—Dry Farming.

There are six essential, positive factors in the production of agricultural crops; they may be designated in this way:

1. Seed.
2. Land.
3. Heat.
4. Light.
5. Moisture.
6. Food or manure.

There are many negative factors against which the plant should be protected, such as injury from insects, birds, or other animals, fungus, and other diseases, or parasites, weeds, and even excess of some positive factors, such as moisture. To ignore any important essential factor is certainly to be one-sided, and this may result in disaster.

SEED

As we have indicated, seed is placed as a factor of most importance.

The Illinois Experimental Station has produced, as an average yield of three years, 15.6 bushels per acre of one variety of wheat, and 6.1 bushels of another variety, on the same kind of soil.

The fact that the soil is poor helps to show the character of the wheat, because it requires a good variety of wheat to make a fair yield on poor soil.

In this case the soil, of course, was the same, and the wheat the same, excepting that the vitality of one kind of seed was tested and the other was not.

Large seed are, as a rule, better than small seed, even though they may be of the same variety and all of good vitality.

Thus, as an average of seven years, the Ontario Agricultural College produced 62 bushels of oats per acre from large seed, and only 47 bushels from small seed, both selected from the same stock, and grown in the same field each year.

This certainly argues for the selection of seed, and the preference that should be given seeds of the larger variety.

SELECTION

The selection and breeding of plants is

at least as successful as the breeding of animals. Thus may plants be developed for power to yield or for special purposes.

The Illinois Station has in ten years' breeding developed two strains of corn, one of which now contains six per cent. more proteid than the other, and two other strains, one of which contains about three times as much oil as the other, all four strains having been bred from a single variety of corn.

HOME OF THE PLANT

You, as a man, are dependent for your color, your physical strength, your mental culture, and indeed for everything else, on two great factors, viz.: heredity and environment. It is much the same with the plant. The home of the plant may vary from a stiff impervious clay, offering a very shallow feeding range for plant roots, to porous, friable, fine sandy loam, affording a deep feeding range.

Good under-drainage, and a large use of organic matter, including deep-rooting plants, which are the best sub-soilers, and sometimes applications of marl or ground limestone, say ten tons to the acre, will do much to improve clay soil.

An old English saying runs in this way:

"Clay on sand is money in the hand;
Sand on clay is money thrown away."

TEMPERATURE

A proper temperature is very important in crop production. Some plants grow well in cool weather, while others do best under tropical conditions.

Dark soils are warmer than the light-colored soils, a difference of several degrees being noted during the afternoon in the early summer, and this difference extends to a depth of several inches. But the greatest factor in soil temperature is moisture.

Improperly drained soils are cold soils, because great quantities of heat are required to remove surplus water from the soil by the process of evaporation.

Thus, to melt ice requires only 79 heat units, and to raise water from the freezing point to the boiling point requires only 100 heat units, but to evaporate water requires 536 heat units. If the surplus soil water can be removed by under-drainage the sun's energy may then be expended in warming the soil.

LIGHT

Light is an absolute essential in the process of plant growth.

One of the damaging effects of weeds is that they shut off light to a greater or less extent from useful plants.

Crops drilled north and south permit the strong midday light to reach the plant, and thus insures a hardier growth than when sown broadcast, or drilled in an east and west direction.

In green house culture light is very commonly the limiting factor in plant growth.

MOISTURE

Moisture is probably the most variable factor in crop production. Many seem to think that if we have timely rains, we should always have good crops; although on almost every farm there are some patches of ground which produce twice as much as others, even though the rainfall, seed, preparation, cultivation, etc., are alike on both areas.

It may be safely stated that when corn or other crops begin to wilt in time of real drought, the cause is more commonly due to a lack of plant food than to a lack of moisture.

The conservation of moisture in humid sections is a matter the importance of which is often much exaggerated.

If the expense so often advised for extra cultivation were devoted to a more

liberal use of manure, clover, limestone, and phosphorus, greater and more lasting profits would result.

A MATTER OF SURPRISE

It is a matter of surprise to many people that a good crop of corn can be produced with but little cultivation after the crop is planted; but they forget that 40 bushels of wheat, 80 of oats, 3 tons of clover, etc., are produced on good soil with no cultivation after planting.

On good lands in humid sections the greatest benefit of cultivation is due to the killing of weeds.

For soils deficient in plant food, especially in nitrogen, frequent cultivation will hasten the decay of organic matter, and often increase the crop yield.

DRY FARMING

In the semi-arid region, fallow cultivation is practiced during one season, the soil being stirred after every rain, in order to prevent evaporation, and thus store up sufficient moisture in the soil to give the crops a good start, especially a fall-sown crop like winter wheat, which, with moderate rainfall the next spring will usually produce a good yield.

On the other hand the much-talked-of "dry farming" is a misnomer.

Above everything else, every success in "dry farming" is coincident with a fair amount of rainfall; and the prospective investor is warned not to be misled by the extravagant reports of successful "dry farming." It is possible and practicable to conserve and accumulate moisture with very moderate rainfall, so that one crop can be grown about every two years, and much can be done to advantage where crops are grown every year; but the fact remains that 75 per cent. of "dry farming" does not achieve as great results as farming in the humid regions.

There is every reason to believe that an increased rainfall follows the plow.

When the writer of this was a very young man, immediately after the Civil War, he was connected with surveys on our western plains. He recalls distinctly that in the area west of the one hundredth meridian, there was very little rainfall, and, of course, no farming at that time.

Except for the grazing of cattle, which might be inferred from the grazing of buffalo and antelope, at that time the country appeared to have no prospects, certainly not as a farming region.

There were a few cotton woods along the smaller streams, and these were thicker

in the Kaw River bottoms; to-day most of this region is occupied by productive farms, orchards have been planted, and trees are succeeding. This proves that the rainfall increases as the plowed area increases.

In the days of which we speak the plains were covered with buffalo grass, which shed water like an umbrella. When rain fell, as it frequently did in great quantities, it poured down the undulating slopes into valleys, or arroyos, and wore for itself a narrow passage to the nearest river.

Now that the buffalo grass has been broken up and replaced with timothy and clover, and the rain has a chance to percolate into the soil, the sudden floods of former days are comparatively unknown. Springs have sprung up where they were unknown before, and the rainfall has about doubled.

CULTIVATABLE LANDS

It is our firm belief that much of our western territory now considered wholly unfit for farming, will become a farming country. This may be depended upon where the precipitation or rainfall equals 15 inches during the year, and where there is clay sub-soil which will retain the moisture.

CHAPTER XI

FRUIT TREES

Buy the Best—As to Economy—Young Trees — Healthy parents — Parasites — When to Plant.

The best way to secure good fruit trees is to buy them from the nearest nurseryman, provided you know him to be reliable, as most of them are.

When purchased from the nurseryman the stalks are more likely to be adapted to the conditions of climate and soil under which you intend to grow them.

Then, there is the saving in freight.

Again, the trees are out of the ground but a short time and therefore the roots are less likely to dry out.

Another fact, you have an opportunity to visit the nursery and to examine the goods before purchasing.

The only trouble with going to a neighboring nurseryman is that he is not apt to have a great number of varieties. He deals in the things necessary to supply the local demand. For the best and choicest

varieties you must go to the nurseryman who makes a specialty of raising the particular kind of fruit tree you wish. To do the latter, it will, of course, take more time, but if you intend to produce a rare variety of fruit it will be time well spent.

You, like other farmers throughout the country, have no doubt had visits from the nursery agent. This person is usually a suave, well spoken, gracious young man, whose goods are always "the best on the market," and the firm or house he represents is always the "most reliable." Now, all this may be true, let us hope it is, but it is often found that the tree agent's produce, though very alluring as he presents the case, often ripens into disappointments.

It usually pays to go to the home grower to buy stock, trying to propagate it under his directions.

The best nurserymen, and the best is the only kind to deal with, are usually able, honest men who propagate stock in order to supply the local market and they do it well. We have great faith in these men and want to encourage them.

AS TO ECONOMY

Buy the best fruit trees you can get.

Do not be led astray by the false economy of buying a second or third-class article, not only in trees but in anything else.

It does not pay.

If you want to plant, let us say, an acre of orchard, the saving by buying second-class stock will rarely amount to more than a few dollars. The most critical period in the growth of a fruit tree, or plant, is in its first year, and it is therefore better to pay a few dollars more for the sake of getting good trees or plants with which you are sure to make a good start, than it is to buy a cheaper kind.

GOOD TREES

The first-class tree, like the first-class man or woman, is one that is healthy, well grown, of medium size, and free from injurious insects and diseases. These plants should also have good habits—and the same may be said of human beings.

Always get first-class stock for the home garden.

The first price for a tree or plant is comparatively small in relation to its progress and profit.

There is as much difference in plants as there is in people.

It is not enough to have a tree, bush or vine, which will bear fruit of the desired variety. It is more than that. You want your trees to bear the very best kind of fruit of its variety.

The florist takes cuttings from plants in his hot house which blossom best. The gardener saves seeds from his best melons or other fruits and vegetables; why, then, should you not secure the very best kind of fruit trees, and, if necessary, propagate from these?

TRY FOR THE BEST

Do not be satisfied, if you really love plants, in simply trying to grow fruits. Try to grow the very best, and you know this "very best" cannot be had from ordinary stock.

You should remember that it is best to select trees, vines, or, indeed, anything that can be grown in your garden or farm, from the very best plants.

Insist that your nurseryman furnish you with stock propagated from parents that represent the best types of the several varieties.

HEALTHY PARENTS

Be careful not to introduce disease and insect pests on the stock. Most of the dissemination of fruit tree pests, all the country over, is due to the infection of the parent stock.

The nursery offers the best opportunities for the spread of infection.

Many home gardens have been seriously

injured through infection *bought* with the fruit tree or plants.

If this infection is in the plant itself, you may be sure that it originated in the seed.

PARASITES

Every animal and every plant has its own parasite, not one only variety but countless other varieties which live upon it.

It might be well to note here that life continues through death. We live day after day through the death of vegetable and animal life; and animal life itself, whether it be carnivorous or omnivorous, exists through the death and destruction of some form of animal or vegetable life.

Nature, another term for God's laws, does not take into consideration the dignity or the usefulness of the animal. Man, the highest type of all, and made "in the image of his Maker," is quite as subject to diseases incurred by parasites, as is the lowest form of parasite itself, for it may be well to remember that parasites live on other parasites as well as on more highly organized forms.

YOUNG STOCK

You will find in purchasing fruit trees that young stock is the very best.

Many fruit growers, who are not posted

in this business, and they are usually residents of the city, suddenly struck with a love for country life, want to start their garden or farm as near maturity as possible. As a result they buy old trees; that is, trees which they think are nearest maturity, and which will give their farm or garden an air of long habitation, if not of antiquity. Of course this is a very great mistake.

In some special cases, trees from four to five years old may be good as immediate producers, and these trees may give fairly satisfactory results.

As a rule, however, such trees are too old to adapt themselves to their new environment, and as a consequence, the fruit can never be as great in quantity, nor as good in quality as if they were planted when young and so allowed to adapt themselves to their environment.

WHEN TO PLANT

Usually the best time to plant fruit trees is in the spring.

Under some conditions, fall planting is successful, but at that season there is always a greater element of risk. If a severe winter follows the fall planting, the trees are more likely to be injured than if a severe drought follows a spring planting.

The hardier fruits, like apples and pears, usually succeed better when planted in the fall than do the tenderer trees, such as peaches and plums.

Never plant trees in the fall on ground that is likely to be wet through the winter. Fall planting must be confined to well drained soil.

Plant early enough so that the trees will make roots before the ground freezes. We think that the best time for this is from the last of September to the middle of October, in, say, latitude of 40°, which is about that of New York City.

A FRUIT GARDEN

If the land you propose to use for a fruit garden is in sod, it is best, if possible, to put in some vegetable crop for one or two seasons before it is planted with fruit trees. This helps to get the ground into a uniform and mellow condition.

If planting is done in the spring, manure the ground freely the previous fall, especially that part on which you intend to plant fruit trees. Plow and prepare the soil as carefully as you would for the planting of a garden. Plow the whole acreage deeply and manure it well.

It is a very bad practice to plant your fruit trees in a hole cut in the sod. Pre-

pare the soil as heretofore indicated, plowing under a heavy coating of manure if the soil is light or poor. As with every human effort, a thorough preparation is one-half the battle, indeed, it is more than half, for it saves much subsequent labor and disappointment.

ABOUT PRUNING

Of course, every farmer prunes his fruit trees, or thinks he does, for he cuts off certain branches, or parts of branches, at certain times of the year, and imagines that it is in every way a benefit to the trees.

There should possibly be some trimming before planting. If you will look at the plant bought from the nurseryman, you will notice that a good deal of the root system has been cut off in the digging.

Cut off the bruised and broken ends and thin out the crowding and interlacing roots.

A judicious thinning of the roots of fruit trees at the time of planting, particularly if they crowd, interlace, or girdle with one another, will do them good. To meet the loss of roots, cut back top of tree from 1-4 to 1-2, according to the extent of the root system left.

Peaches, apricots, and other one year old trees planted, may be trimmed until the

boll resembles a whip, that is, till they have no branches left.

The only exception to the general rule that the tops should be cut back at planting time, is that when the trees are planted in the fall, they should be planted with all the branches on, and the pruning should be done in the following spring.

PLANTING

In planting trees bring them from the nursery and keep them near the orchard site or place that is going to be their permanent habitation. If the orchard area has been laid across with stakes, plant the trees just where the stakes are set.

It is a very easy matter to map out your ground and indicate exactly where your trees are to be planted, so that the intervening space may be utilized for other purposes until the trees have reached maturity, or at least, the bearing stage.

We have probably said in this chapter what every fruit grower knows, and knows, perhaps, better than we do, but we are not writing this for the expert but rather for the novices, in this, one of the most important departments of agriculture.

CHAPTER XII

HOUSE FLIES AND INSECT PESTS

Is it so small?—An experiment—The Typhoid Agent—Need of Cleanliness—Keep up the Work.

If we do not exterminate the house fly it will exterminate us. Formerly the insect was regarded as of little or no consequence and deemed harmless, but science has incontrovertibly proved that it is one of the most formidable foes of humanity to-day—a foe which is yearly slaughtering tens of thousands of the race.

Of course, a fight is being waged against it, and in many places it has been repulsed and its forces driven from the field, but in point of numbers its army is legion, and while it is compelled to fall back in one place it rallies in another. In many cases there is little opposition and consequently it has an easy victory. Many people as yet don't realize its power for evil, hence, they take little or no part in the warfare against it.

IS IT SO LITTLE?

A fly lights upon your face, you feel its antennae touching your skin, so you put up your hand and brush it off, and think no more about it; but could you bring home to yourself that the kiss of that fly may be more deadly than that of Cleopatra's asp, you would sit up and take notice, you would give attention to the problem that is now engaging the benefactors of humanity, the problem of completely exterminating this insidious foe and freeing the nations forever from its loathsome and deadly embrace. Don't think the fly a little thing unworthy of your efforts, little things count for good or bad, and it is an aggregation of little things that makes up the mightiest whole.

Little drops of water,
Little grains of sand,
Make the mighty ocean
And the great, dry land.

The fly which you think so little, carries over a million bacteria on its wings and body, each of which may be a fatal germ capable of dealing disease and death to a whole community; as it buzzes around your head, it may be shaking from its wings typhoid and malaria, cholera and consumption (tuberculosis) and other terrible

scourges to afflict and carry off the healthy to untimely graves.

According to the statistics of the Health Department of New York City, half the deaths from typhoid fever in the city each year, can be attributed directly to the distribution of germs by the house fly. The pest, after being generated in filth and feeding on all kinds of decomposing matter, flies into houses through windows and doors, settles on and poisons the food, flits from person to person of the household, and thus accomplishes its fatal work. When the mother brushes the fly from the cot of her sleeping babe, she may little think that she has expelled a murderer, but such is the case. Five-sevenths of all the children who die in this country yearly, through bowel complaints and other infantile affections of the intestines, are virtually slaughtered by the house fly, its deadly infection killing them by the thousands.

AN EXPERIMENT

Not long ago an interesting experiment was made by the authorities to determine just how many germs a house fly could really carry, and it resulted in discovering on a single specimen, 1,222,570 bacteria of different kinds, enough to have killed all

the men of Grant's army in a month's time.

This was interesting but alarming. However, another experiment caused greater alarm. A fly was caught in a sterilized fly-net and dropped into a bottle of sterilized water; the bottle was shaken so that the germs could be washed from its body, then the water, which was previously pure, was examined, when it was found that the fly's bath had filled it with over 5,000,000 germs. Now the same would have occurred had this fly fallen into the baby's milk bottle, and the little one instead of drinking a life-sustaining liquid, would have been literally drinking a germ-poisoned fluid.

When we come to consider the unventilated garrets, cellars, dens, closets and unsanitary living apartments of our great cities and towns, where God's sunlight never enters, where fresh air is unknown, where the filth-generated flies muster in millions, the wonder is that the decimation of population is not greater than it has been.

THE AGENT OF TYPHOID

That the house fly is the advance agent for typhoid has long been known, but in its official capacity of death-dealer it brings many other scourges in its retinue. It

brings Asiatic cholera, bubonic plague, dysentery, diphtheria, scarlet fever, variola, or small pox, in fact in its train may be said to come the grinning ghouls of all kinds of diseases and death.

Yet some people never give a thought to this dreadful scourge of mankind, they are too busy or too careless to bother with it and so it is allowed to go on unchecked in its fearful ravages of the race.

Surely it is time to awaken to the danger and lend a helping hand in the grand crusade against this pest which may fittingly be termed the scourge of men. Attila was termed "The Scourge of God" and Nero was a human butcher, but both combined did not slaughter in all the years of their infamy, as many as one house fly can slaughter in an hour's time.

CAN WE DESTROY IT?

Some claim that it is impossible to exterminate the house fly, owing to the rapidity of breeding. In midsummer the female lays about 120 eggs and in twelve hours these hatch into 120 more flies. The females of the second generation themselves lay another batch of eggs of the same number a day after they come into being, a day later the third generation repeats the laying, and so the breeding goes on. From

this it can be seen that a single fly may produce millions in a week's time.

NEED OF CLEANLINESS

Notwithstanding this great fecundity and its rapidity the problem of extermination is not unsolvable, nay, it can be solved easily if the right method is adopted. That method is through cleanliness. Only cleanliness will rid us of the house fly. Filth is as necessary to fly life as are air and water to animal life; it cannot exist without filth. It comes into being in filth, in manure heaps, in all kinds of decaying and animal matter, and it is on such matter that it feeds and is enabled to live. Therefore, the only way to get rid of the fly is to do away with filth of every kind which would afford it a breeding place and maturing place. Keep the house and its environments clean and the fly will give both a wide berth. Have the sanitary arrangements as perfect as possible. This is not so easy to do in country places and on farms as in the city where the flush system of sewage prevails, still the sanitation laws can be enforced everywhere. All privies and middens should be as far from the dwelling house as possible, and human excreta should never be exposed but always covered with earth. No box privies should

be permitted unless on the earth-closet principle, that is, with a proper vault or receptacle enclosed by earth and only a small opening at top. Stables and byres should be well ventilated and all excrement and bedding removed to the midden heap once a day, and a fresh supply of the latter provided. If possible, sprinkle the manure heap from time to time with a solution of chloride of lime, or lacking this, sprinkle it with kerosene.

Keep all garbage cans and refuse bins covered and dispose of their contents as soon as possible. See that all vessels, particularly milk vessels, are kept clean. Leave no food or fruit uncovered, particularly flesh food, so that flies can alight on it. Screen windows and doors, especially the windows of sleeping rooms, and keep them as dark as possible during the day. This particularly applies to the sleeping apartments of babies and children.

KEEP UP THE WORK

If such measures be adopted and rigidly adhered to, so that perfect cleanliness will be obtained, the fly problem will be satisfactorily solved, and a bill of $350,000,000 saved annually to the Nation, for such is the estimated sum that the pest costs yearly through sickness, medical treatment, and undertakers' bills.

Mr. Domestica Musca, as the house fly is named in the domain of entomology, has a good and faithful coadjutor in *Mr. Culex Anopheles,* called by common people the mosquito. Mosquitoes breed in stagnant pools and still water, in lowlands, undrained swamps and such, and the best means, therefore, of keeping them away is to allow no stagnant water to gather anywhere on the premises, for where there is no such water the eggs of the mosquito won't hatch. The authorities are making good progress in exterminating this annoying nuisance, by spraying swamps and meadows and still pools with kerosene and chemical compositions of various kinds.

Apart from a consideration of the house fly and its dangers to human life, as a disease-carrying factor, there are many other noxious insects which, if not germ distributors, deprive the nation annually of a huge sum by the destruction of trees, crops and vegetables of all kinds. The loss entailed to the farmers is so great that in many cases it counterbalances the profits.

CHAPTER XIII

BEES

Bee Culture—Pleasure in the Work—Annual Output—Place for Apiary—Hives.

WHAT IS BEE CULTURE?

Bee culture is the means of obtaining for human use, a natural product which is abundant in almost all parts of the country, and which would be lost were it not for the honey bee.

The annual production of honey and wax in the United States makes apiculture a profitable minor industry. From its very nature it can never become one of the leading agricultural pursuits, but that there is abundant opportunity for its growth cannot be doubted. Not only is the honey bee valuable as a producer, but it is also one of the most beneficial of insects in cross-pollenating the flowers of various economic plants.

PLEASURE IN THE WORK

Bee keeping is usually very fascinating

to many people as a pastime, furnishing out-door exercise as well as intimacy with an insect whose activity has been a subject of absorbing study from the earliest times. It has the advantage of being a recreation which pays its own way, and often produces no mean profits.

It is a mistake, however, to paint only the bright side of the picture, and leave it to the new bee keeper to discover that there is often another side. Where any financial profit is desired bee keeping requires hard work and work at just the proper time. Otherwise the surplus of honey may be diminished or lost. Few lines of work require more study to insure success. In years when the available nectar is limited, surplus honey is secured only by judicious manipulations, and it is only through experience and reverses that the bee keeper is able to secure a crop. In seasons of plenty, anyone can produce honey, but these seasons do not come every year, and it takes a good bee keeper to make the most of poor years.

ANNUAL OUTPUT

The average annual yield of honey per colony or hive for the entire country, will probably be 25 to 30 pounds of comb honey, or 40 to 50 pounds of extracted honey. The money to be obtained from

the crop depends entirely on the market, and the method of selling honey. If sold direct to the consumer, extracted honey brings from 10 to 20 cents per pound, and comb honey from 15 to 25 cents per section. If sold to dealers, the price varies from 6 to 10 cents for extract honey, and from 10 to 15 cents for comb honey. All these estimates depend largely on the quality and neatness of the product. From the gross return must be deducted from 50 cents to $1.00 per colony for expenses other than labor, including foundations, sections, occasional new frames, and hives and their incidentals.

It should be emphasized that the only way to make bee keeping profitable is to produce a first-class article.

We cannot control what the bee brings to the hive to any great extent, but by care, we can get them to produce fancy comb honey, or, if extracted, it can be carefully cared for and neatly packed to appeal to the trade.

Too many bee keepers pay but little attention to making their goods attractive. They should recognize the fact that of two jars of honey, one in an ordinary fruit jar or tin can with poorly printed label, and the other in a neat jar of artistic design, with a pleasant, attractive label, the latter will bring double or more the extra cost

of the little package. It is unfortunate, but nevertheless a fact, that honey sells largely on appearance, and the progressive bee keeper will appeal as strongly as possible to the eye of his customer.

LOCATION OF THE APIARY

The location of the hive is a matter of importance. As a rule it is better for hives to face away from the prevailing wind, and to be protected from high winds. In the North, a south slope is desirable. It is advisable for hives to be so placed that the sun will strike them early in the morning, for, until the sun comes, the bees do not get active.

It is also an advantage to have the hives shaded during the hottest part of the day, so that the bees will not hang out in front of the hives instead of working. They should be so placed that the bees will not prove a nuisance to passers-by, or disturb live stock. This latter precaution may save the bee keeper considerable trouble, for bees sometimes prove dangerous, especially to horses.

The plot in which the bees are place should be kept free from weeds, especially in front of the entrance. The hives should be far enough apart to permit of free handling. If hives are too close together

there is danger of bees entering the wrong hive on returning, especially in the spring.

NUMBER OF HIVES

As a rule, it is not considered best to keep more than 100 colonies in one apiary, and apiaries should be at least two miles apart. There are so many factors to be considered, however, that no general rule can be laid down.

The only way to learn how many colonies any given location will sustain, is to study the honey flora and the record of that place until the bee keeper can decide for himself the best number to be kept, and where they should be placed.

The experience of a few good bee keepers in keeping unusually large apiaries, indicates that the capabilities of the average location are usually under-estimated.

To the majority of bee keepers the problem of size is not important, for most persons keep but a small number of colonies.

OUT-APIARIES

Out-apiaries, or those located away from the main apiary, should be so situated that transportation will be as easy as possible. The out-apiary should also be near to some friendly person, so that it may be pro-

tected against depredation, and so that the owner may be notified if anything goes wrong. It is especially desirable to have the apiary in the partial care of some person who can hive swarms or do other things that may arise in an emergency. The terms under which the apairy is placed on land belonging to someone else, is a matter for mutual agreement. There is no general usage in this regard.

THE APPARATUS

It must be insisted that the only profitable way to keep bees is in hives with movable frames. The bees build their combs in these frames, which can then be handled by the bee keeper as necessary. The keeping of bees in boxes, hollow logs, or straw "skeps," is not profitable, and should be strongly condemned.

Bees in plain boxes with no frames, and with combs built at the will of the bees, are too often seen in all parts of the country. The owners may obtain from them a few pounds of inferior honey a year, and carelessly keep up this old-fashioned practice. In some cases this style of bee keeping does little harm to others, but where diseases of the brood are present the box hive is a serious menace, and should be abolished.

HIVES

It is not our purpose to advocate the use of any particular make of hive or other appliance. Some general statements may be made, however, which may help the beginner in his choice.

There is a type of hive generally used in this country, known by the name of its inventor, Langstroth. It consists of a plain wooden box, holding frames hung from a rabbet at the top, and not touching the sides, top or bottom.

Hives of this type are made to hold from eight frames upward. The sizes of frames in general use are from 9 1-8x17 5-8 inches.

The number of frames used depends on the kind of honey produced, whether comb or extracted, and on the length of honey flow, and other local factors.

There are other hives used which have points of superiority. But as the patent on the Langstroth hive has expired and its manufacture is a very simple matter, we should advise our friends who think of starting an apairy, to make hives of this character for themselves.

In making such a hive as we have mentioned, it is necessary that the material should be of the very best quality. The parts must be accurately made, so that all

frames or hives in the apairy are interchangeable.

All hives should be of the same style and size; they should be as simple as it is possible to make them, so as to facilitate operation. As a rule it is better to buy hives and frames from the manufacturer of such goods, rather than try to make them, unless one is a good wood worker.

The choice of a hive, while important, is usually given undue prominence by the writers on bees. In actual practice, experienced bee keepers, with different sizes and makes of hives, under similar conditions, do not find as much difference in their honey crop as one would be led to believe from the published accounts.

HIVE STANDS

Generally it is best to have each hive on a separate stand. The entrance should be lower than the other parts of the hive. Stands of wood, bricks, tile, concrete blocks, or any other convenient material, will answer the purpose. The hive should be raised above the ground so that the bottom will not rot. It is usually not necessary to raise the hive more than a few inches. Where ants are a nuisance, special hive stands are sometimes necessary.

OTHER APPLIANCES

In addition to the hives in which the bees are kept, some other apparatus is necessary. A good smoker, consisting of a tin or copper receptacle to hold burning rotten wood, or other material, is necessary. A veil of black material, preferably with a silk tulle front, should be used. Wire-cloth veils are also excellent. Even if a veil is not always used, it is well to have one on hand in case the bees become cross.

Cloth or leather gloves are sometimes used, to protect the hands, but they are apt to interfere with the work. Some sort of tool, to pry hive covers loose, and frames apart, is desirable. A screw driver will answer, but as there are tools made for that purpose, they will, of course, be better.

THE KIND OF BEES

In starting an apiary it is better to begin with good, strong colonies. Of course, no surplus honey can be expected if it all goes into the making of additional bees. It is desirable to get as little drone comb as possible.

The question as to what race and strain of bees is to be kept is important. If poor stock has been purchased locally, the bee keeper should send to some reliable queen

breeder for good queens, as a foundation for his apairy.

Queens may be purchased for $1.00 each for untested, to several dollars each for "selected" breeding queens.

Various breeds of queens have been imported into the United States, and among experienced bee keepers there are ardent advocates of these foreign queens. The black, or German queen was first imported very early in the history of this country. As a rule this race is not desirable. No attention has been paid to improving it, and it is usually found in the hands of careless bee keepers. As a result it is inferior, although it often produces beautiful honey combs.

OTHER VARIETIES

After the German queens came the Italians, and the latter still maintain their popularity in this country. They are vigorous workers and good honey gatherers. They defend their hives well, and above all, have been more carefully selected by American breeders than any other race.

Italian bees have been carefully selected for color, by some breeders, to increase their area of yellow on the abdomen, until we now have what are known as "five-banded" bees. These bees are beautiful,

but it can hardly be claimed that we have improved them as honey producers or that they have become more gentle in this land of the free.

Caucasian bees, recently distributed throughout the country, by the Department of Agriculture, are the most gentle race of bees known. They are not stingless, however, as is often stated in newspapers and other publications. They are good honey gatherers and they are more politic than the Italians. Their worst characteristic is that they gather too much comb in proportion to the honey supplied. There are other varieties of bees which it is not necessary to mention here, but the knowledge of which may be easily obtained if any reader will write to the Department of Agriculture and state his wishes.

SOME DIRECTIONS

Bees should be handled so that they will be as little disturbed as possible in their work. In handling bees care should be taken to avoid the stings, not so much because they are painful, but because the odor of poison which gets into the air, irritates the other bees and makes them more difficult to manage.

The bee keeper should manipulate without showing fear. This is not because the

bees recognize the fact that the operator is afraid of them, as some claim, but because superfluous quick movements tend to irritate the bees.

The hives should not be jarred or disturbed any more than necessary. Rapid movements should be avoided, because with their peculiar eye structure, bees probably perceive motion more readily than they do objects. Persons not accustomed to bees, on approaching a hive, often strike at bees which fly toward them, or make some movement of the head or hand to avoid the sting which they feel is to follow. This is just what should not be done; the rapid movement, even if not toward the bee, is far more likely to be followed by a sting, than if one remains quiet.

The best time to handle bees is toward the middle of warm days, particularly during a honey flow. Never handle bees at night or on cold, wet days, unless absolutely necessary.

The work of a beginner can be made much easier and pleasanter by keeping gentle bees.

Before opening a hive, a smoker should be lighted and the veil put on. A few puffs of smoke directed in the entrance will cause the bees to fill themselves with honey, and will drive back their guards. The hive covers should be raised gently, if

necessary being pried loose with a screw driver or a special tool. As soon as a small opening is made more smoke should be blown in on the tops of the frames. It is not desirable to use any more smoke than just enough to subdue the bees and keep them down on the frames. At any time during manipulation if they become excited, more smoke may be used. Do not stand in front of the entrance, but at one side or at the back.

During all manipulations bees must not be mashed or crowded, for that irritates the colony greatly and may make it necessary to discontinue operations. Undue crowding may also injure the queen. If bees crawl on the hands, they may be gently brushed off or thrown off.

In handling frames the comb should always be held in a vertical position, especially if it contains much honey. When a frame is lifted from the hive by the top bar, one side is exposed to the operator, with the comb placed vertically. To examine the reverse side, raise one end of the top bar until it is perpendicular, turn the frame on the top bar as an axis, until the reverse side is in view, then lower to a horizontal position with the top bar below. It is extremely difficult to remove combs built cross-wise, in the hive, and this should never be allowed to occur.

REMEDIES

Various remedies for bee stings have been advocated, but they are all useless. The puncture made by the sting is so small that it closes when the stinger is removed, and liquids cannot be expected to enter. The best thing to do when stung is to remove the skin as soon as possible, without squeezing the poison sack, which is usually attached. This can be done by scraping it out with a knife or finger nail. After this is done the injured spot should be let alone, and not rubbed with any liniment. The intense itching will soon disappear and any irritation only serves to increase the after-swelling.

A beginner in bee keeping should by all means if possible, visit some experienced bee keeper to get suggestions in handling bees. More can be learned in a short visit than in a much longer time in reading directions, and numerous short cuts which are required by experience, will well repay the trouble or expense of such a visit. Not all professional bee keepers manipulate in the very best way, but later personal experience will correct any erroneous information. Above all, personal experimenting and a study of bee activity are absolute necessities in the practical handling of bees.

CHAPTER XIV

ABOUT BUILDING

Concrete—What is Concrete?—How to Make It—A Common Mistake—Other Buildings.

CONCRETE

In the old days and over the country as a general rule to-day, wood is the common substance used, if not for the dwelling house, certainly for the out-buildings on a farm. But the supply of wood on each individual farm, and throughout the country at large, is decreasing at an alarming rate.

There is one substance now coming into very general use by architects and engineers, which promises to supplant wood, and to a great extent iron, in the ordinary structure work; this is concrete.

Here are some of the things you can do with this wonderful substance: You can build concrete foundation, quite as strong and enduring as the best cemented granite; you can make sidewalks, fences, water

troughs, cisterns, tanks, cess pools, gutters, cellar floors, steps for the barn, cellar and stable, well-curbs, horse blocks, cattle stalls, hog pens, troughs, chicken houses, corn crates, ice houses, hotbed frames, abutments for bridges, chimneys, dams, fence posts, clothes posts, hitching posts and a thousand and one other structural articles which we have not the space to mention.

WHAT IS CONCRETE?

The three ingredients of concrete are cement, sand and broken stone, all carefully and thoroughly mixed together with water.

All sorts of proportions are possible, 2½ parts of sand, 1 of cement, and 5 parts of crushed rock, are the usual proportions.

Sand taken from a pit is best. It should be as free as possible from clay, soil, sticks, leaves and other rubbish.

Drop a handful of sand into a pail of clean water. After a few minutes if you can see the sand at the bottom of the pail, it is clean enough, so far as clay is concerned. The rock should be broken up into irregular pieces, having clean surfaces. The smaller the better, if the pieces be not too small.

In mixing, it is best to use a water-tight platform, or a shallow box. The proper

amount of sand should first be spread in a layer and on top of this the cement should be scattered. Mix dry until the whole mass is uniform in color. Then make a hollow spot or crater in the middle of this mass, and pour the proper amount of water into it, a little at a time, being careful not to make it too soft.

The dry matter should be worked up from the outside toward the center, and then turned rapidly with shovels, water being added by sprinkling until the proper consistency is reached. The broken stone, thoroughly wet, is added after the cement and sand have been mixed. Where considerable concrete work is to be done on the farm, it would be well to buy a mixing machine. These vary greatly in prices, but a satisfactory one can be purchased for about $100.

We need not add that such a machine is only necessary where there is a great amount of work to be done. After all, it is a question of cost between hand labor and machine labor, and if a machine cannot be kept in frequent use, perhaps it would be as well not to buy it.

PROPORTIONS

While in general use the proportions 1 to 2½ to 5, are recommended, for unim-

portant work, where the concrete is put in masses, such as in backing for stone masonry, or in large foundations, a mixture of 1 to 4 to 8 will do. This is a leaner mixture, however, and would not be satisfactory in ordinary cases.

INSTRUCTIONS

In order to reinforce concrete for fence posts, when the forms are laid, and before pouring it in, place some old barb or bale wire, or steel rods in the forms in such a position that they will take care of the strain. If this is not done, some of the posts are sure to break when the fence wire is stretched. Wood is unsatisfactory as a reinforcing material and should never be used.

It might be thought that if wood rots, steel also corrodes or oxidizes, but the latter is not the case. It should be remembered that the steel is put into a wet mass, and that as this dries and contracts the air is excluded, and without the admission of air, which contains, as you know, a large percentage of oxygen, rust is impossible.

A COMMON MISTAKE

A common mistake in estimating the amount of concrete that will be required to

fill a given space, and the number of cubic feet, is to assume that 10 barrels of broken stone, 5 barrels of sand, and 2 barrels of cement, will make 17 barrels of concrete.

From such a mixture the quantity of concrete obtained would be but slightly greater than the amount of cracked stone used, because the cement and sand simply fill the spaces between the stones. Keeping this in mind, it is easy enough to estimate the cost of concrete work.

When you know how much a barrel of cement costs, delivered on your farm, and you add to it the cost of the crushed stone and sand, you can estimate the number of cubic feet in the mass you are going to build, by multiplying the length, breadth and height together. Then figure the amount of cracked stone you will need, and let it serve as a basis for your calculation. If it will take 5 barrels of cracked stone to fill a space, you will need one barrel of cement, where the proportion is 1 to 2½ to 5.

OTHER BUILDINGS

Every farmer should have a hotbed if not a hothouse.

The hotbed will give you weeks of advantage in forcing your cabbage, tomatoes, and other plants that have to be transplanted.

The hothouse, of course, has to be arti-

ficially heated and no matter the size, it is roofed and usually sided with glass. In such a place some vegetables can be raised during the winter, and a fair supply of flowers, even in a very small space.

But we do not propose to go into any details as to a hothouse at this time, but rather to show how the more easily built, and equally essential hotbeds can be made without very great expense.

ITS USE

As just intimated, a hotbed is a necessity to anyone who raises his own seedlings, of tomato, cauliflower, lettuce, celery and early cabbage, instead of buying them in the spring from the seed stores or other producers.

The great advantage of knowing exactly what varieties one has, is obvious.

There should be no mystery about the making of a hotbed, yet many people, because they do not know how, are content to go on year after year in the same, sad old way. The warmest and most sheltered spot in the place is the one where you should locate your hotbed.

A CONVENIENT HOTBED

Have a groove for seven sash, each 3 by 6 feet. For the frame, 2 by 3 joists, and

some 1 by 10 cypress plants, or if cypress cannot be obtained, spruce will do. On the ground where the hotbeds are to stand, a space of about 20 by 5 feet should be dug, to a sufficient depth, so that when the framework of the plants is set up and levelled, the interior space will be about 4 feet deep.

At each of the 4 corners set firmly 4 posts, locust are preferable, and along the sides other posts to sustain the planting.

The south front of the frame should be made by one plant, the back part of the frame having two. This gives a slope to the surface at an angle of about 30 degrees, which means catching most of the sun's heat and light during the midday hours.

Six 1 by 3 joists running from the back to front, that is from north to south, support the sash. Grooves are not necessary as the sash will be plain and without the tongues usually formed on more elaborate frames.

THE NEXT MOVE

Three feet of fresh, stable manure, well drenched with water, make the heating material. The frame should then be closed up and two days later the soil for making the bed must be thrown in.

The earth should be firmly banked around

the frame. Then another fence of old boards should be built about two feet from it on the north side, and the intervening space on the outer sides filled with manure, which should be pressed in tightly.

It is folly to make a hotbed and then allow all the heat to escape. Therefore, the glass of the sash must have some covering, otherwise, it will radiate heat to an excessive degree.

There are many kinds of covering for the sash, to be used at night and when the sun's heat is not powerful. This covering may be made of straw mats, old carpets, boards, burlap or any old cloth covered with parafine or other nonconductive substance.

If these coverings cannot be had, a good one can be made from soft hay, if near the seashore, or of marsh or other tough grasses, if away from it.

If you have not a hothouse on your place, build one in your spare moments; the cost will be but little and you will find that in the very first season it will more than pay you for all your effort, and will save all the expense of purchasing the plants to which we have before referred.

CHAPTER XV

ABOUT CHICKENS

Where to Start—Good Stock—Hatching—Temperature—Nature's Way.

WHERE TO START

The chicken business may be started on an ordinary town lot. The best soil is that which contains sand or gravel, but not loose stone. If your back yard or garden is not sandy it will be well to cover it with sand a trifle higher than the surrounding land. An orchard makes an excellent chicken yard. Slightly rolling land is best and for choice a southern or eastern exposure. Excellent results have been obtained by the Philo system by allowing only four square feet of land for each fowl, and of this three-fourths is devoted to the fowl and the rest to walks. If it be possible to have twice as much land per fowl, you may use half of it for gardening and alternate the two, thus insuring rich garden soil.

GOOD STOCK

The original stock for your enterprise is of the first importance. The beginner will do well to start his chicken farm with two pairs of fowls, but these should be as thoroughbred as possible. Do not begin with any stock cheaper than $10 a pair, and if you can afford more so much the better. If you are buying eggs you will need two settings and these should cost $5.00 each. If you can be sure of the fertility of the eggs, hatch in February or March, but if you cannot have them guaranteed, you had better start in April, May or June. Unless the chickens hatch out in the winter or early spring, they will not need special protection in the way of a brooder.

Much depends upon the selection of breed, but it is a question one must decide largely for himself. Assuming that you are raising chickens for meat and eggs there are several excellent standard breeds. If you are raising broilers, select, preferably, one of the heavier breeds. Some of the lighter birds, on the other hand, are thought by some to give a greater egg yield than the heavier fowl. In some markets white eggs bring a higher price, in others there is a demand for brown eggs. Make certain which variety will bring the

best price in your locality and choose your hens accordingly.

The fresher the egg the better it is for hatching. If it be possible to set the egg the same day it is laid, so much the better. Excellent results may be obtained at times with eggs two or three weeks old, but as a general rule they should never be set if more than one week has passed. By keeping eggs they lose not only in fertility but in moisture. As the hatching process progresses, the air space in the egg grows rapidly larger. Later by holding the egg up to the light it may be determined at a glance whether it is fertile and it is worth while keeping it in the nest or incubator. Incidentally a perfectly fresh egg may be hatched without artificial moisture.

IN HATCHING

Great care should be taken in regulating the temperature during the period of incubation. A temperature of 115 degrees will kill the germ of the egg in a few hours. On the other hand the process of incubation may be started if the egg is subjected to a temperature of eighty-five degrees for a period of twenty-four hours. The eggs should be changed daily during incubation, but it is unnecessary to reverse them. Do not allow them to stand on their ends.

To secure strong fertile eggs it is absolutely indispensable that a vigorous young cockerel be placed with the hens. Hens from two to five years old are best for producing fertile eggs for hatching. If a single hen be placed with several cockerels, a large proportion of the hatch will be cockerels, perhaps as high as ninety per cent. As the number of hens is increased this proportion is lowered. As a rule it may be set down that when the vitality of the male is greater than that of the female, male chickens will result.

The result of your hatch by incubator will depend first of all on the quality and condition of your eggs. Assuming that you have adopted the plan here suggested for securing fresh eggs from good breeds and of the highest fertility, the process of incubation should present few difficulties. There are half a dozen incubators on the market which may be depended upon to give excellent results. The regulation of the heat by means of the thermostat in these machines is very delicate and may be depended upon. The machines will work almost automatically without attention, but not quite.

TEMPERATURE

The first week is by far the most critical in the entire process of incubation, so that

during this period the incubator should be the object of the most careful attention. The thermostat should be set for one hundred and two degrees. The temperature should be taken by resting the thermometer on the upper ends of the eggs. Throughout the first week this temperature should be maintained as steadily as possible. Later it is important that the eggs be regularly cooled, but during the first week they require little outside air. The eggs should be turned twice or thrice a day. It is unnecessary to turn them completely over, but merely to readjust their position, and this should be done as quickly although as gently as possible.

During the second week the heat may safely be raised one degree or to one hundred and three degrees, and held there. Continue to turn the eggs two or three times a day and after the last turning allow them to cool for five minutes. The room meanwhile should not be less than sixty degrees. Great care should be exercised to keep the lamp from going out and the eggs becoming cooled off. Should such an accident befall however, if the cooling process has not gone on too long the heat may be restored without serious results.

The germ of the egg should begin to develop in a few hours after the incuba-

tor is started, and in a few days should be clearly visible. To test the egg, hold it before a candle or small lamp in a darkened room. The darkened portion will be found to grow steadily larger and the air space will grow from the end towards the middle. If, after one week, the egg remains clear it should be taken from the incubator and thrown away to make room for the other eggs. It is important that you have as much room as possible in the incubator when the chickens appear. The eggs should be cooled five minutes longer each day during the third week and towards the end of the period of incubation the time may be extended to half an hour. During the last week it will be well to place a pan of water in the incubator. If the shells are particularly hard a woolen cloth dampened with warm water may be laid over the eggs.

NATURE'S WAY

When hatching with hens, it is well not to trust the process too far to her instinct. Be careful to place the nest in a dry sheltered spot. The ground as a rule is better than any arrangement of shelfs. A quiet hen is of course best for the purpose. Although the hen will turn her eggs more or less, it is well to make sure of this and

when she is off her nest to carefully change their position. When the chicks appear it is important that you be on hand to assist any weaklings through the shells. The misdirected energy of the mother hen in striving to pick the eggs apart to liberate the young, is often too vigorous and the young hopeful receives a serious blow which may well prove fatal.

Excellent results may be had by trusting the incubating process to the hen and then looking to the brooder to bring them up. Whether hatched out by the incubators or hens the chicks should be placed in the brooder very early, since they quickly learn their way about. The little chickens should be kept in small broods. In large flocks they crowd each other. A common mistake is to keep the temperature of the brooder much too high. Excellent results are obtained in the Philo system, for instance, without artificial heat of any kind. More chickens are roasted to death than frozen in the brooders.

FEEDING

A very fine meal moistened in milk makes a good food for the first few days. Ordinary white bread is excellent. It should be ground or cut into very small pieces and scattered about so that the chicks may gain some exercise in search-

ing for it. Dry meal may be used a few days or even hours later. Raw meat finely chopped is also excellent, but should be fed in very small quantities during the first few days. The floor of the brooder or part of it should be covered with fine chopped grass or clover. This will help to keep the brooder clean and the chickens will be found to eat it freely. Do not forget a little fine gravel or ground oyster shell which may be sprinkled on the floor.

The first week is the critical one in the life of the little chickens, and once past this stage the worst may be considered over. The feeding during the next two weeks should be much the same as during the first few days except that the bread and milk diet may be changed. As the chicks grow older they will require more exercise. This may be given them by covering a part of the feeding place with soil and burying the food beneath it. They will soon learn to scratch vigorously for their food, which is the very best thing for them. The feeding after the first three weeks depends upon what use the chicks are being raised. The chickens to be used for breeding, should not be fattened quickly. Give them grain, green food, chopped meat and corn, but make them work for it as much as possible. The object in growing such

stock is to develop bone and muscle and not flesh alone.

FOR EARLY MARKETS

To force your stock for early maturity, feed them constantly, tempting their appetites in every way. A wet mash made of wheat bran, ground bone and beef scraps should be fed liberally. Keep the chickens' crops constantly full. To produce good broilers feed at least five times a day. Keep these chickens on the ground meanwhile, and do not allow them to scratch, climb or fly any more than possible. Their bodies soon outstrip their legs, and leg weakness is likely to result. If these chickens be allowed to exercise too much their muscles will quickly harden and the tenderness of the meat will be lost. With intelligent care such broilers should be developed to weight two pounds by the end of eight weeks.

There is large profit in raising eggs for the market. The secret of success lies obviously in producing eggs when the market price is high. As a general rule it may be stated that the most abundant egg yield comes from chickens fed plenty of food as bulky as possible. A great deal of grain varied as much as possible is especially recommended. Many successful chicken

farmers feed their laying hens all they can eat. To obtain early eggs which will bring the best prices requires long and patient labor, but the result should be within the reach of all. The best plan would seem to be to use only the early hatched chickens for breeding purposes. Care should be taken that the chickens should not be closely related. The further apart they may be, the better will be the results. The offspring of early hatched chickens mated with still other early hatched chickens will in time develop a bird which will mature earlier and come into laying a little before its parents. Continue this process for several years and remarkably gratifying results may be obtained, and the profits of your egg farm immensely increased.

HOUSING

Of the variety of brooders and chicken houses there seems to be no end. A score of men believe they have solved the problem and discovered at last just the right design. Many of them are justified in their claims. Without going into details it may be stated that on general principles the best chicken houses are those which conbine good soil, plenty of ventilation and lighting. A sandy soil which insures good drainage, is best. If wooden floors be

used the utmost care should be exercised to keep them clean. A variety of diseases extremely difficult to cope with are induced by unsanitary conditions. An ounce of prevention is worth almost any weight of cure.

The ventilation is of the utmost importance. A door or a window which may be thrown open is not enough. It should be possible to throw open an entire section of the roof, even in cold weather. Sunlight is food and medicine for the chickens. The exposure should be towards the south. The house should be flooded with sunshine. Fresh air and sunlight aplenty will do more to make your chicken venture a success than all the scientific care in the world if these essential elements be neglected.

CHAPTER XVI

GOOD ROADS

How to Start—Scientific Work—Mistakes —Makeshifts.

The United States has taken up the good roads problem in recent years with characteristic energy. It is, of course, too much to expect that the average of roads in America should be equal to that of Europe.

The magnificent distances in the United States, and the comparative youth of many parts of the land, present great difficulties. In view of the situation, however, the progress has been remarkable. There is a widespread educational campaign in progress in the interests of good roads from the Atlantic to the Pacific. The Federal and State Governments are lending their assistance by instructing local boards and individuals in the best methods of road building, besides granting immense sums to road building and maintenance.

A great impetus to road building fol-

lowed the establishment of the Office of Road Inquiry by the Federal Government in 1893. The work of the Department is largely educational. It has been well organized and many people, in widely scattered sections of the country, have benefited by it. The Government details engineers and experts in road building to give instruction and information of the most practical nature. The perplexed road builder is advised, and samples of road building material may be sent to the office for examination.

An immense amount of practical road building is carried out to educate the public in the art. Several complete sets of road building apparatus are kept in readiness to be sent out with intelligent demonstrators to show just how work should be done. The cost is watched very closely in these tests and the assistance rendered is of the most practical and helpful kind.

HOW TO START

It is a simple matter to take advantage of the state assistance. Naturally, there are a great many applications, and it is important that the petition should be regularly filed. The first step is to interest the County Board of Supervisors. A petition should be prepared either by the

County Board of Supervisors or a majority of the land owners along the road, stating that the public interest demands the improvement of a particular highway.

The petition for state aid should then be forwarded to the State Engineer. In different states the law varies somewhat. It of course should be ascertained who is the proper authority to address. The petition is next investigated by the State Engineer. If the plan meets his approval, the road, which it is proposed to build or improve, must then be surveyed. The plans and specifications for these improvements, as he determines them, are forwarded to the County Board of Supervisors. Upon their approval, they are returned to the State Engineer, and placed on the official list of roads to be improved. The construction of roads is carried on as rapidly as the state appropriation permits. In this way every one is treated alike, and they receive attention in their proper turn.

The expense of road building is shared, as a rule, by the state, the county, and the township. The proportion made by each varies in different states. A common plan is for the state to pay three-fourths, the county one-eighth and the township one-eighth. In some states, the state pays two-thirds and the county and township

each one-sixth. There are a great variety of plans for keeping up the road and beautifying it. In some sections of Delaware and Maryland, it is a common practice for the farmers along the highways to plant and cultivate regular hedges to serve as fences, and each land owner is required to devote a fixed number of days each year to trimming and caring for the hedges. As a result, the entire country-side is beautified at a trifling expense.

Building roads is a science. The existence of so many bad roads in the United States is not due wholly to neglect, but to lack of intelligence in using the materials at hand. There are a few general rules, insisted upon by the Government Engineer, which will insure good results, even with a comparatively small expenditure of time and money. For the average farmer, the dirt road is the only possible form of highway. If properly planned and kept up, such roads will give satisfaction and stand the wear and tear of ordinary traffic without much expenditure.

In the first place, it is a common mistake to start road making when the earth is hard and settled. The best time to begin is in the early spring, just after the frost is out of the ground. If it is impossible to start at this season, it will be better to wait for another year. When the wind

and sun have dried up all the moisture from the surface, road building is practically out of the question. It is a common mistake to scrape up worn out material from the gutters and place it on the crown of the road. The plan is worse than useless. The material will remain on the surface, to be converted into mud when it is wet and thick dust when it is dry.

If the work is started before the moisture has been dried out, the material will be found to incorporate itself with the road, producing a good bed. It is a common mistake to leave the road until late in the season when good results are practically out of the question. A very common mistake is to scrape clogs of earth and vegetable matter from the gutters to the centre of the road and leave them there in the hope that the traffic will wear them smooth. These clogs do not make good road material. The first rain washes them down, covering the road with mud.

The presence of a great deal of vegetable matter, such as pieces of sod, bushes or roots, compels travel to make two tracks. These will wear deeper and deeper, thus forming an ugly shoulder, which is certain to break up into ruts and mud holes. There is a mistaken idea that any old refuse or scraps may be dumped on a road with safety and that the traffic will sooner or

later wear it down to a hard, unyielding surface. There are many thousands of miles of roads ruined in this way every year.

To keep a road in condition, it is essential that the culverts should be kept clear and in a good state by frequent cleaning. Instead of dumping refuse on the road, or scraping up the clogs from the side, the crown should be arched up carefully so that the rain will not soak in. New material should be placed in the hollows or flattened places, and it should be handled with a shovel and not merely dumped from a wagon. This method produces humps and hollows which it is difficult to correct.

FAULTS

When a persistent mud hole exists, it is useless to try to remedy it by filling in. The drainage of the place must be looked to. It is absolutely essential that the bottom of the trouble be attacked, not merely the surface. The road builder should have an especially sharp eye for places where water collects and stands beneath the surface. This will in time honeycomb the earth so that it will eventually break through. In order to keep roads in good condition, some improvement of a permanent nature, should be done each season,

and on every section. The culverts, bridges or drainage should be looked to. If a road be allowed to go without attention, it quickly deteriorates, and the cost of improvement will be found to have increased astonishingly.

A MAKE-SHIFT

The dirt road is after all a preliminary stage. Almost all farmers look forward to having a macadam road. If the dirt road has been properly built and cared for, it will serve as an excellent foundation for the improved highway. The subgrading will be ready for the stone work. In planning a macadam road, it is a common mistake to lay out too broad a roadway. Many road builders have come to grief by attempting to build boulevards, when a comparatively narrow road will serve their purpose better. It will be recalled that the Appian Way, the famous road leading into Rome, was but from fourteen to eighteen feet in width. Many towns plan macadam roads one hundred or even one hundred and fifty feet in width when a twenty foot road will serve much better. The narrower road presents fewer engineering problems, it is easier to keep in shape and, of course, less expensive.

ERRORS

One of the commonest errors in building macadam roads, is to place too thick a layer of stone on the road bed. It does not pay to put on stone thick enough to withstand the encroachment of springs or badly drained sections. It is much cheaper and better in the end to put the stone on thin and protect it. As a general rule, the stone should be eight inches in depth in the centre and six inches deep at the sides of the road.

The cost of macadamizing a road varies in different localities. According to Government figures, a macadam road costs from 55 to 98c. per square yard. A sand clay road costs but 9½c., and a burnt clay road, 20c. per square yard. Brick roads are likely to be too expensive for ordinary rural districts. It is often cheaper to buy good road material and carry it one hundred miles or more, than to use inferior qualities to be found near at hand. The Government is very glad to answer any questions, and if samples of materials are sent to them, they will examine them and report on their value.

DUST

The increased speed of modern traffic

has greatly complicated the dust problem. The slow moving farm wagon makes little dust, but the automobile changes the situation. The simplest plan to prevent dust is to cover the road with straw. The dust works into the straw, and is matted down just as in a stable yard. Dust may be prevented by oiling, but it is important that an oil should be used which is rich in hydrocarbons. There is considerable art in applying the oil.

In the first place, the road should have a good foundation to keep the oil crust from breaking. The best plan is to provide a waterproof covering of crushed lime rock or fine clean sand. The coal tar preparations are excellent. The road should first be swept carefully and all dust removed. In case of rain, wait until it dries. Tar should be applied hot to penetrate as far as possible into the macadam. First apply it, spreading with a broom, and when it is dry, a few hours later, brush it off evenly. A layer of fine clean stone will take off the surplus, when it should be carefully rolled. From one-quarter to one-half a gallon should be used at every square yard. It will be found to cost about 1c. per square yard, or at the rate of $3.00 per mile, for a sixteen-foot road.

CHAPTER XVII

WHAT THE HANDY MAN KNOWS

To Destroy Pests — The Stalk-borer — Plant Lice—Arbor Building—Beauty of Water—Gardens—Forms of Beauty.

He knows how to protect fruits and vegetables from the ravages of insect pests.

When he wants to get rid of the squash bugs he lets the chickens into the squash patch and they very soon devour the slugs.

To destroy the Colorado beetle which does so much damage to the potato he goes through the potato ridge carrying a shallow pan having a little kerosene oil in the bottom in one hand and a short stick in the other. He holds the pan under the leaves and hits the vine a sharp slanting tap with the stick, knocking the beetles into the pan where they are killed by the kerosene.

After a shower he effects the same object by dusting the potato leaves with lime, wood ashes or even road dust. Any

of these agents kill the beetles when the latter are wet.

He never uses Paris-green in the garden,—that is for field culture. It is poisonous to human and animal life and often destroys the vegetables themselves.

He treats the insect known as the flea beetle differently. This beetle is a little jumping black insect which bores through the potato leaves like a needle and predisposes the plants to blight. To get rid of this pest the handy man sprays the leaves with tobacco water,

ANOTHER DESTROYER

There is a mysterious insect which attacks potatoes called the stalk-borer. We often find the stalks when they should be vigorous lying withered on the ground without any apparent cause. Their decay is owing to the ravages of the stalk-borer which eats the inside pith out of the stalk. As the handy man cannot get at the inside he pulls up the stalks thus affected and burns them so as to exterminate the pest.

The cutworm is one of the most insidious foes of vegetables and grain. It has three stages of insect life. A moth which flies at night makes its appearance in late Summer and lays eggs on various kinds of plants. These eggs hatch during the Fall

and the young cutworms after feeding for a short time bury themselves in the ground where they remain over Winter. When vegetation starts in the Spring they wake up from their long sleep and start their work of destruction. They carry it on during the night, gnawing off the plants at the ground and even climbing up to devour the leaves. When they reach full size they stop eating, crawl into small holes in the ground and change their forms, becoming chrysalids or cocoons. From this stage they emerge later as moths when they again lay eggs and start the old round of tripartite evolution. The damage they do as cut-worms is incalculable. They lay waste whole sections of corn and cereals. On large farms efforts have been made to destroy them by spreading on the fields a composition of Paris-green, bran and molasses, but this cannot be used in the garden. The handy man to cope with the pest in the garden uses a dressing of wood ashes and common salt, and also gets up early in the morning and hand-picks them off the vegetables, which is about the best way to get clear of them.

The cabbage worm does immense injury to this variety of vegetable when not stopped in its ravages. It comes from the egg deposited on the leaves by a whitish butterfly. The handy man knows this and

protects the cabbages with fine mosquito netting, thus keeping off the butterflies from depositing their eggs on the leaves. He also dusts with salt, lime, wood ashes or pepper and even sometimes he uses hot water. If these are not efficacious as he would wish he resorts to picking off the pests with his fingers.

The cabbage maggot gnaws at the root and stem of the vegetable. The handy man forestalls the maggot by wrapping paper around the stem before planting so that she cannot lay her eggs next to it. If he should forget to do this *before* planting he afterwards puts a disk of tarred paper around the stem or a ring of wood pulp or old paper softened to a pulpy mass.

Maggots also attack onions and the onion maggot is much worse than the cabbage one. The handy man covers the onion bed with mosquito netting until the young shoots are ready for transplanting. After they are transplanted if the maggots appear he gives them a douche of carbolic acid emulsion. To make this emulsion a pound of hard soap is shaved fine and dissolved in a gallon of boiling water. Then one pint of crude carbolic acid is added and the whole thoroughly churned into a perfect mixture. To one part of this mixture 30 parts of water are added and the

solution is strong enough to kill the maggots when poured close to the plants. This is good, or rather bad, for all kinds of maggots. Another remedy of the handy man consists of sand mixed with kerosene. This is scattered along the rows and is very effective.

CORN WORM

The corn worm is much akin to the "Boll worm" of the South and the tomato worm of the North and like the potato stalk-borer it does its deadly work in the inside. So fond are these insects of corn that in the South to rid the cotton fields of it they plant patches of corn here and there to which it makes its way, leaving the cotton free. It defies the handy man. All he can do is burn the ears as soon as they become infected. There is no remedy either when it attacks the tomato —the vegetable has to be cast aside and destroyed to prevent the breeding of the insects.

Squash insects are also inside borers. The eggs are laid by moths and after hatching the borers work into the vines. The handy man opens the vines and cuts the insects out and then covers the cut with dirt. In a short time new vines begin to grow in place of the one that has been

destroyed. The squash bug is often called the "stink bug;" it is one of the most disgusting insects that annoy the garden. It not only takes the plant juice but poisons it.

To prevent their attacking the squash the handy man often puts tobacco dust and fish scrap around the plants.

For plant lice, those minute insectivoræ, which do deadly destruction to all kinds of vegetable life, the handy man has a remedy in an emulsion of kerosene or a solution of whale-oil soap which he sprays on the leaves of the plants.

The handy man kills the asparagus beetle by dusting lime on the plants while they are wet.

The bean weevil causes damage to peas and beans, not while growing, but when they are stored up for winter use. The small black insects make holes in the seeds. To get rid of these pests the beans or peas are put in a barrel or box made air-tight. On the top of them in a soup dish the handy man places a quantity of bi-sulphide of carbon and then covers the top with a blanket. The bi-sulphide of carbon generates a gas which being heavier than air sinks downward through the beans, killing all living things with which it comes in contact.

The handy man never kills the lady-bug

beetle for he recognizes it as one of his best assistants in helping to exterminate the harmful and injurious kind. He also encourages the toad for the batrachian is a relentless foe of insect life. So the handy man is glad when he hears its early morning or late-at-night croak among the vegetables.

Besides the bugs and insects, vegetables, plants and trees suffer from fungi or vegetable excrescences which produce rust, smut, mildew, mold, leaf-spots, canker and other evils causing both stem and fruits to rot. Fungus growths are common to low-lying lands, moist situations and undrained soils. The handy man has no specific remedy to check fungus, he can only bring his knowledge to bear concerning the laws regulating the rotation of crops, the proper selection, the nature of soils, etc., to ward off its encroaches. When a plant is given full chance to grow according to nature there is little risk of its developing a fungus growth. Plant-health is the best offset to such growth. The potato is the vegetable that is most subject to blight. Before planting the tubers many people steep them in formalin (one pound to thirty gallons of water) for several hours. This is said to render the produce impervious to blight or fungus scale.

In addition to caring for the vegetables

and flowers the handy man about the garden can make it a veritable bower of beauty, in reality a garden of the gods, a miniature paradise, a spot sacred indeed to the household and the home. He can make open walks and shady paths, hidden nooks and cozy corners, flowery arbors and delightful summer houses; he can ornament it in a hundred ways to delight the eye and charm the heart. He can construct

Lovely bowers of innocence and ease—
Seats for youth and old age,—all to please.

He can make Art assist Nature in such a way that the latter becomes impressive in her regal grandeur, captivating, enthralling.

ACCESSORIES THE HANDY MAN CAN CONSTRUCT

He can make a summer house, an appendage which is now considered a necessity in every well-regulated garden.

In the construction of a summer house there is no call for elaboration or classic architectural design. The simpler the better in order to give a pleasing effect to the whole. Its location should be where it will not interfere with the appearance of the general surroundings; it must not be con-

spicuous but rather secluded in some quiet corner or another as if retiring from the view of outsiders. Nature in the way of trees and bushes can be made to contribute to its construction. The roof can be of wooden slats or of living branches trellised and intertwined. The bark of trees overlaid gives a very pretty and time-worn effect. If the grounds are large enough the handy man can make it a miniature house with doors, windows, passages and corridors, but such is not to be encouraged except when the area is large. Smallness gives an impression of cosiness and cosines in turn lends an air of happiness and contentment to the scene. It can have requisites in the way of benches and tables and easy chairs, lounging chairs and swings, with shelves and even running water, for the summer house should be an ideal place for one to entertain his or her friends of an evening or have a quiet cup of tea after the labors of the day.

There are almost as many styles of summer houses as there are styles of architecture, but the handy man will be guided by condition and environment, by the size of the garden, the number in the family, their ages and many other contributing circumstances. There are thousands of plans and designs for him to follow. The summer house with a thatched roof of pine-

needles looks very pretty. The handy man can beautify and embellish his work in many ways,—by clinging vines, by ivy, by ferns, by several kinds of climbing creepers. He can either paint it or tar it; in the latter case he can stick it over with dried bark or fir cones or pine needles or whatever other form of ornamentaation occurs to his fancy. In the construction of summer houses when the props or supports are not living trees red cedar is one of the best woods, as it is very durable and has a pleasing fragrance.

ARBOR BUILDING

The handy man can show his skill in the construction of an arbor. There are many interesting kinds of arbors suitable for gardens. Pergolas also take great variety of form. Pergola is a new word of Italian origin and formerly signified a variety of grape. It is taken now to include trellises, bowers and all overarched pathways. Probably it came to its present meaning from the fact that overarched pathways were generally ornamented with grape vines. Pergola and arbor now mean much the same thing. In the old-style gardens the arbors were called "green galleries," and were composed of trees arched in such a way that they completely met over-

head and formed a regular living tunnel. They were very striking and picturesque. The handy man can make his pergolas and arbors in many designs according to the materials he has at hand. A pergola should lead to some object like a summer house, a bench, or a fountain; or it may connect one part of the garden with another or act as a screen, the same as a hedge between a flower garden and a vegetable or kitchen garden. Flowering vines and climbers appear to the best advantage when trained on the posts and cross beams of an arbor, and the glimmering light and shade that plays along this covered way make it a charming feature of garden magic. The great garden pergolas of Europe, notably those of Italy, have massive marble columns for supports and are charmingly beautiful peeping out from the wealth of vines and other clinging shrubs and creepers which ornament them. One form of arbor commonly seen in our gardens in this country is so simple as to be nothing more than a series of single arches spanning a pathway. These arches are generally of wood, but sometimes of iron, a material which is more lasting and just as pleasing when the greenery covers it.

MAKE BEAUTIFUL

A fountain or small pool gives to a

garden a living picturesqueness which nothing else can add. Ever changing in form and color in the sunshine the iridescence of a fountain is as much a living thing as the surrounding flowers that set off its beauty. Most country places have water in sufficient quantity in the shape of springs and wells and brooks that it is easy to tap with a pipe. In towns where the water is metred out there can be a stop-cock fixture for turning on and off, and instead of a fountain there can be a placid pool. Another thing that will add to the picturesqueness of a garden pool is a catch of fish sporting about in their native element.

Here is a description of a small garden pool constructed by a handy man around the place. The garden itself is not large, not over one hundred feet square. The pool is near the centre and is elliptical, about 10 feet wide and 30 feet long. There is no curb between the water and the open grass border around it, the turf coming right down to the water's edge in a natural way that is very pleasing. The supply pipe in the centre throws a natural stream a few feet into the air and is controlled by a stop-cock on the edge of the bank. The sides of the pool have vertical walls of field stone set in cement and the bottom is concrete. The pool is three feet in depth.

The water is allowed to remain all the year round, but it is covered around with boards and hay in the winter so that it never freezes hard enough to injure the water lilies that are planted in tubs and allowed to remain at the bottom.

In building a pool or fountain in any part of this country where the winters are severe all such work must have solid foundation below the frost line, and the shut-off that controls the supply must be lower than the outlet of the water-jet. This is to insure the entire running off of the water so that there will be none left in the pipe to freeze and burst it. The handy man can ornament his fountain with statuary in many designs, according to his aesthetic taste.

GARDENS

Gardens require enclosures, walls, balustrades and fences, and in building any or all of these the handy man is called upon to show his skill and worth.

A wall gives an air of seclusion to the garden and at the same time protects it from severe winds. Walls are very useful as a support for vines and climbers and for the training against their flat surface of several varieties of fruit trees. Flowers and vines always look well with a wall for a background. The appearance of a

wall traced in greenery with bright blossoms peeping out here and there gives a very beautiful effect. It has been said that vines are to a wall what dress is to a woman, they enhance beauty or cover defects.

In the construction of his wall the handy man can use any kind of stone or brick, as eventually the flowers and shrubs will hide their composition from view. Field stones can be fashioned into the walls in many attractive ways as is evidenced from the stone ditches that compose the old New England farm walls which to-day are most beautiful and appealing in their ruins.

All garden walls need a capping of some kind to give them a finished appearance. If the wall is a field stone the handy man may use large flat stones of the same kind or rough pieces of quarried granite. A brick wall needs a capping of dressed stone in keeping with the smooth outside of the bricks.

When gardens are built sloping or on a hillside the handy man can display his ingenuity in constructing terraces. A garden made on different levels has a great advantage over one laid out on a flat surface for it presents so many different points of view from which one may see it up and down in various charming perspectives.

A terrace may have as much variety in form and color as the garden itself. The higher a terrace wall has to be constructed the thicker it should be made in proportion so that it can support the back weight and not cave out.

Balustrades of stone or other less expensive material such as concrete, brick or wood are often necessary for surmounting a terrace wall in order to give an air of security and to prevent one from walking over the edge. This garden accessory lends itself to various designs and can be made very ornamental.

As far as fences the simplest and perhaps the best is the picket fence or fence of palings. They are generally painted white or whitewashed. Iron fences are not advisable for small gardens. They are too ornamental and costly and are more adapted to set off large enclosures.

THE SUN-DIAL

The sun-dial is an ornament to any garden and useful at that. The fact that it marks only the sunny hours does not detract from its value; its charm renders it always an object of interest. A sun-dial must be made for the latitude in which it is set up. One that will point to the right time in London would not do so in New

York. Sun-dials were the only time-keepers for centuries before the invention of clocks and watches. As the handy man may be called upon to make one, here are a few suggestions:—

A sun-dial is divided into two parts, the dial face and the gnomon, or style, that projects at an angle from the face and marks the time by the shadow it casts. Its upper surface must form an angle with the dial that shall be the same number of degrees as the degree of latitude for which the sun-dial is made. The spacing of the hour marks computed for different latitudes, and the gnomon should point to the true North, the North Star, and the whole dial should be absolutely rigid and level. The dial should be made of some permanent material like bronze or stone, and mounted on a strong, rigid, steady pedestal. The most appropriate pedestals are made of stone and marble. A solid foundation is necessary, otherwise the frost will throw the pedestal out of plumb and the dial face will not record the right time. If the handy man has a poetic soul he may inscribe some appropriate motto on the dial such as

> My face marks the sunny hours,
> What can you say of yours?

FORMS OF BEAUTY

The handy man may add many more or-

namental accessories to the garden, such as garden gazing-globes which very prettily reflect the surrounding scenery. They are perfectly round, made of thick glass with mercury on the inside and are generally mounted on a composition pedestal. Marble is better if it can be obtained, but if neither marble nor composition can be had a wooden pedestal will do.

Lanterns are another decoration which both by day and night give very handsome effects on shady corners or in arbors. They can be made after the Chinese fashion, so popular or so common at festive gatherings.

Little pieces of statuary well placed are very pleasing to the eye peeping from among the green tracery of leaving and branches.

A vase placed here and there adds very materially to the natural charm. They should be filled with suitable flowers in keeping with the surrounding tints.

If the garden is large a very useful and effective accessory would be a few bee skeps. The handy man could gather into them the stingless variety of bees and make them both ornamental and useful.

Seats and tables are important acessories to the garden. There can never be an air of comfort about the garden if there are no resting places. In the construction

of seats the handy man can show his designing skill. They may be of any design provided they serve the purpose. They can be made of wood, tree branches or of stone. Stone answers very well when properly placed. A seat should be in some vantage point and preferably in the shade. If there are trees in the garden it is customary to build circular seats around them.

A table serves a useful purpose in the garden. If possible the handy man should set up one or two of marble or stone. If he cannot get these materials and must use wood he should build tables stoutly.

The beautifying or ornamentation of the garden shows but the aesthetic versatility of the handy man, but there are many other ways in which he can demonstrate his usefulness.

The handy man should be able to trim, prune, slip, cut, graft; he should be an adept with knife and shears among vegetables, fruits and flowers; he should know the principles underlying the cross-breeding of plants as to improve the species.

Grafting should be done in the commencement of the year just before the sap begins to circulate in the tree. The stubs to be grafted should be about 2 inches in diameter. They should be cut from all parts of the tree. The scions or young shoots should be cut about 6 inches long,

they must be of last year's growth, never older. They can be shaved down with a sharp knife into a wedge shape. At the top of the wedge on the thick side a bud should be left. Two scions are put on each stub, one on each side unless it be too small. The stub heals better in this way and there is greater probability of getting a successful graft. The size of the scions depends on the size of the stub, one-quarter of an inch is the average diameter. The scions should be firmly pressed into the stub. After the scions are inserted the crack should be thoroughly covered with grafting wax. If both grafts on a stub "take," that is, grow, one of them should be removed the summer after grafting, otherwise both scions would crowd each other.

RECIPES

Grafting Wax—To 4 pounds resin and 1 pound beeswax add 1 pint linseed oil; put in heavy pot, melt slowly, mix well; pour into tub cold water and pull by hand until it gets a light color. Work into sticks and keep in cool place until wanted. In using, oil the hands, work the wax until soft and press it tightly around the grafts and over the cracks.

Kerosene Emulsion for Insects—Kerosene one gallon, sour milk ½ gallon. Di-

lute one part emulsion to nine (using cold water) for scale insects; one part to 20 for soft insects.

The best emulsion is made by dissolving ½ a pound of whale-oil soap in a gallon of hot water and mixing this with 2 gallons of kerosene until it thickens into an emulsion.

Whale Oil Soap for Killing Plant Lice—Six pounds caustic soda, fish oil 22 lbs., water 6 quarts. Dissolve soda in water. Then add fish oil, slowly stirring. No boiling is necessary. Experiment with different strengths.

Cross-Breeding—This is the process by which we cross different species so as to produce new plants, having the characteristics of both parents. In order to cross put the pollen of the flower of one plant on the pistil of another. The stamen has 3 parts—the thread-like stalk, the anthers at end of stock and the pollen which is borne in the anthers. The pollen is the vital part, without it no seed can be formed. The pistil or group of pistils occupies the center of the flowers of the plant. Like the stamen the pistil consists of 3 parts. The main part where the seed is borne is at the base and is called the ovary. Above this ovary is a stalk called the style and at the end of the style is the *stigma*, or the place where the pollen dust must fall to form the

seeds. Pollenation is the placing of the pollen of one plant upon the stigma of another. Fertilization takes place when the dust of the pollen unites with the contents of the ovary. The transference of the pollen is made in many ways. The simplest is to pluck the pollen bearing flower and shake it over the stigma. Often a brush is used to brush the pollen into the ovary. A single pollen grain will fertilize a receptive stigma. Care should be taken that no foreign pollen falls upon the stigma, that is no other kind than the one under experiment.

Cuttings—Cuttings should be placed in sand in preference to claying material. Sink them about 2 inches, pack the sand tight around them and water well. Shade them with newspapers or cloths for three or four days. In about three weeks they will have roots, when they may be put in pots or boxed in fertile soil. This is the general way to treat cuttings of geranium, heliotrope, begonia, fuschia, cuphea, hibiscus, and many other kinds of flowers. Always use a sharp knife in cutting and keep a heel on the "slip" or cutting.

CHAPTER XVIII

AROUND THE FARM

Storing Vegetables—For Winter Keep—To Destroy Weeds—Plant Diseases.

STORING VEGETABLES

Make a small cellar in dry ground convenient to the house. Make it like a saucer and have it about two feet deep. Its size will depend on the quantity of stuff to be stored. Cabbages, turnips, carrots and root vegetables may be stored in such a cellar or pit. Pile or heap them from the bottom until they are about two feet or so above the surface. Then thatch the heap with a coating of straw and over this place about 10 inches of earth. About the middle of the pit a hole may be left for ventilation, but it must be well covered with straw to keep out the frost. The vegetables will come out of such a pit as fresh as when they were put in.

KEEPING CABBAGE THROUGH WINTER

If you have not a great quantity of cab-

bages to keep, get a few barrels and line them with clean paper. Make holes in the ground large enough to set the barrels, to within a few inches of the top. Pack your cabbages tight into the barrels, cover with hay and bank the earth up against the edges of the barrel heads so that there will be a slope of several inches to throw off the rain.

Carrots and beets are best preserved when buried in dry sand. A shallow hole can be scooped and the vegetables piled up something like potatoes, but not so high and then covered with the sand.

Keep onions in a dark place in the cellar, at a temperature of about 30 degrees.

WHEN PUTTING AWAY CELERY

Cover the cellar floor where it is to be stored with several inches of fine, slightly moist soil. When pulling up the celery leave a little of its own soil on the roots. Place the bunches close together and place the dirt well around the roots and well up to the stems.

PRESERVING EGGS—THE LIME WATER METHOD

Take one pound of lime to five gallons of water. First slake the lime in a small por-

tion of water, then add the remainder of the water. Stir it well and leave it to settle. Throw off the lime-saturated liquid and pour it over the eggs. Place in large jars or crocks. To exclude the air, cover the tops with sweet oil or a cloth upon which lime paste is spread.

SELECT GOOD SEED.

Select good seed for all crops. Bad seed no matter how cheap never pays. In England, the average yield of wheat is 30 bushels an acre; in the United States it is less than 15 bushels. This arises from the fact that the English select their seed with greater care. The production of this country could be increased at least $100,000,000 if the proper care were exercised in the selection of seeds.

LIKE PRODUCES LIKE

A crow or a blackbird never has a white offspring. If a stalk of corn produces only one ear, don't sow the kernel from that ear, if you want a stalk which produces two ears. Many stalks produce 3, 4 and 5 ears and from such ears the largest kernels should be selected for seed.

HOW TO GET RID OF WEEDS

The best time to kill any weed is when it is young. Therefore the ground in early

spring should be well stirred to kill the weeds before they can get strong and hardy. Weeds which live only for one year —*annuals,* as they are called—are easily killed in this way. Such weeds are pigweed, mustard, chess, dodder, cockle, crabgrass and jimson seed. Weeds that live throughout two years are called *biennials,* and comprise the wild carrot, thistle, mothmullein, wild parsnip and burdock. Weeds of this kind should be destroyed by cutting the roots below the leaves, using a grubhoe or shug. The third class of weeds are those called *perennials,* which live more than two years and propagate by running root stocks as well as by seeds. They include many species of the tough grasses, dock, canadian-thistle, poison ivy, passion flower and horse nettle. They are most difficult to eradicate. The best plan is to thoroughly take out the roots and destroy them, but if this is not feasible, they may be killed by a strong solution of crude-sulphuric acid. Many farmers try to smother them out by a dense growth of useful plants, but this is hard to do, as they take away the food required by such plants, and the latter are unable to put forth their full strength. In clearing the ground in October and November, it should be imperative for every farmer to rake all weeds into heaps and burn them. If left to decay, the

chances are that a great many will not die but live through the winter to resume activity in the spring and produce their kind.

PLANT DISASES

Plants take diseases as well as human beings, and many of them are contagious. These diseases are caused by bacteria parasites or other living organisms in the plant. When we see blue-mold, as it is called, it simply consists of living minute plants instead of seed. These plants produce many small bodies that serve the purpose of seeds and reproduce their kind. These bodies are called spores. The fungus growth on plants is composed of millions of these spores. Fungi express themselves in the form of mold-forming mildew, scab and other excrescences. They are never green like ordinary plants.

As soon as fungus manifests itself, no time should be lost in spraying with a liquid that will kill the growth. One of the best is that known as Bordeaux mixture.

CHAPTER XIX

THINGS WORTH KNOWING

Broken Crockery—To Clean Chimneys—Shoe Soles—Make Ink—To Sharpen a Razor—Other Good Recipes.

If you intend papering a painted wall you must first get off the paint, otherwise the paper will not stick. To do this mix in a bucket with warm water a quantity of pearl-ash or pot-ash so as to make a strong solution. Dip a brush into this and then scour off the paint, finishing with cold water on a flannel.

CEMENT FOR GLASS, CROCKERY, ETC.

Four pounds white glue, 1½ pounds dry white lead, ½ pound isinglass, one gallon of salt water, 1 quart alcohol, ½ pint white varnish. Dissolve the glue and isinglass in the water by gentle heat if preferred. Stir in the lead, put the alcohol in the varnish and mix the whole together.

TO CLEAN A CHIMNEY

To clean a chimney use a piece of zinc on the live coals of the stove. The vapor produced by the zinc will carry off the soot by mechanical decomposition. Those who have tried the course claim that it never fails to do the work.

HOW TO PRESERVE SHOE SOLES

Melt together tallow and common resin in the proportion of two parts of the former to one of the latter and apply the preparation hot to the soles of the boots or shoes—as much of it as the latter will absorb.

HOW TO MAKE BLACK INK

To make jet black ink that is shiny and glistening when applied, dissolve in ½ pint of salt water 3-8 ounce of potassium bicromate and add 6 ounces of logwood extract dissolved in one gallon of water. Then dissolve in one gallon of water by continued boiling, borax 6 ounces, shellac 1½ ounces. Mix altogether while warm and add 3 ounces of ammonia. When cold it will be ready for use.

TO PURIFY WATER

A tablespoonful of pulverized alum

sprinkled into a hogshead of water, the water being stirred at the same time, will after a few hours by precipitating to the bottom the impure particles, so purify it that it will be found to possess nearly all the freshness and clearness of the finest spring water. A pailful, containing four gallons, may be thoroughly purified with a single teaspoonful of the alum.

POLISH FOR BOOTS AND SHOES

Mix together two pints of best vinegar and one pint of water; stir into a quarter pound of glue, broken up, ½ pound of log-wood chips and ¼ ounce of isinglass. Put the mixture over the fire and let it boil ten or fifteen minutes. Then strain the liquid and bottle and cork it. When cold it is fit for use. The polish should be applied with a clean sponge.

HOW TO RESTORE A CANE CHAIR BOTTOM

Turn the chair bottom up and with hot water and a sponge, wash the cane-work well so that it is well soaked; should it be dirty, use soap; let it dry in the air and it will be tight and firm as new, that is, provided none of the cane is broken.

HOW TO SHARPEN A RAZOR

Steep it for half an hour in water to

which 1-20 of its weight of muriatic acid has been added. Then lightly wash it off and after a few hours set it on a hone. Acid supplies the place of a whetstone by corroding the whole surface uniformly and nothing more than a smooth polish is necessary. This will not injure a good razor and will improve a bad one very much.

FROSTING GLASS

The frosty appearance of glass which we often see where it is desired to keep out the sun or peeping eyes, which we do not want to see us, is done by using a paint composition as follows: Sugar of lead well ground in oil, applied as any other paint. Then pounded while fresh with a wad batting held between the thumb and finger, after which it is allowed to partially dry; then with a straight-edge laid upon the sash, you run along by the side of it a stick sharpened to the width of the line you wish to appear in the diamonds, figures or squares into which you choose to lay it off.

TO REMOVE CLINKERS FROM A STOVE

Clinkers will accumulate on fire brick. Empty the stove or grate of coal and ashes. Then while hot throw in two or three quarts of oyster shells or a less quantity of salt

and you will be able very easily to cleave off the clinkers.

TO BLACKEN A STOVE

Sometimes it is necessary to blacken a stove when it is warm and on such an occasion it is hard to do so because the stove paste dries too quickly. Here is a plan which will work even when the stove is quite hot. Add a teaspoonful of sugar to each teacup of your blacking when mixed and the sugar will have the effect of causing the blacking to adhere to the stove and the heat will enable you to polish it with greater facility and give a better lustre.

HOW TO SHARPEN SCISSORS

Take a coarse sewing needle or darning needle and hold it firmly between the thumb and forefinger of the left hand; then take the scissors in your right hand and cut them smoothly from hand to point several times. The dullest scissors unless they are entirely worn out, can be sharpened in this way.

TO RENDER LEATHER WATER-PROOF

(1) Take a little beeswax and mutton suet, warm in a small pot or pipkin until

in a liquid state, then rub some of it lightly over the edge of the sole where the stitches are and it will repel the wet and not in the least prevent blacking from having its usual effect. (2) Gum copal varnish applied to the soles of boots and shoes and repeated as it dries until the pores are filled and the surface shines like polished mahogany will make the sole water-proof and last three times longer for the application.

HOW TO MEND RUBBER BOOTS

Procure some pure gum which you can get very cheap at any drug store; get your rubber patching,—it is well to have two thicknesses for mending different goods—put an ounce or two of the gum into three or four times its bulk of benzine, cork tightly and allow it to stand for four or five days, when it will be dissolved. Wet the boots with benzine for an inch or more around the hole and scrape with a knife; repeat this wetting with benzine and scrape several times until thoroughly cleaned and a new surface exposed. Wet the cloth side of the patching with benzine and give one light scraping, then apply with a knife a good coating of the dissolved rubber both to the boot and patch and allow it to dry until it will not stick to your fingers, then apply the two surfaces and press or lightly

hammer into as perfect a compact as possible and set away for a day or two, before using.

HOW TO MAKE A HOME REFRIGERATOR

In country places in the summer it is often hard to get ice and when it is obtained a great deal of it is wasted for lack of a proper receptacle in which to keep it. It is rolled in old newspapers or pieces of carpet and other non-conducting materials which, instead of saving the ice, wastes it and prevents it from helping to preserve the food. In absence of a regularly constructed ice box the following may be made in a very simple way. Take two large wooden boxes—dry goods boxes for instance—select the second one about a couple of inches smaller on all sides, and bore a one inch hole in both correspondingly, to give drainage and ventilation. In fact a couple of holes might be bored. Fill up the space under the boxes with powdered charcoal or coal ashes. Put the inner box in place and fill up all the spaces with the same. Sawdust might do if nothing better is procurable, but it is apt to become rusty. Fix on the lids to both boxes to fit tightly with iron hinge and if these cannot readily be obained, leather ones will do just as well. Fasten them with straps of leather

or a lock and key. Put shelves on each side of the inner box by means of cleats. Leave a place in the centre for ice. This will be but a rough refrigerator yet it will serve the purpose as well as some of the most ornamental ones. A zinc lining or one of felting if it could be readily obtained, would improve the inner box. A rack made of lathing can be laid at the bottom for the ice to rest upon. Legs can be added to the outer box by putting pieces of wood at each corner and the drainage and ventilation will be improved. It should be an easy matter for the handy man about the household to construct such an ice chest as this.

HOW TO PREVENT RUST

A composition that will effectually prevent iron, steel, metal, etc., from rusting can be made by mixing with oil about 4-5 of its bulk of spirits of turpentine. Apply this mixture with a sponge and the iron, steel, metal, etc., will retain their metallic brilliancy and remain impervious to rust for a long time.

HOW TO CLEAN WOODWORK

Get a quantity of tea leaves and steep them in a pail with sufficient water to cover them for about half an hour. Then strain them and use the liquid to wash all varnished paint. The tannic acid in the decoc-

tion acts as a strong detergent, cleansing the paint from all impurities and making the varnish equal to new. It also cleans window-sashes and oil cloths, and in fact, any polished surfaces may be improved by its application. It washes window panes and mirrors better than water and is excellent for cleaning black walnut picture frames and looking-glass frames. Do not, however, *wash* unvarnished furniture with it but take a small quantity on a damp flannel, rub lightly over the surface and this will be sufficient.

HOW TO CLEAN WALL-PAPER

Take off the dust with a soft cloth. Use a little flour and water to make a lump of very stiff dough and with this rub the wall gently downward, taking the length of the arm at each stroke, and in this way go around the room.

As the dough becomes dirty, cut the soiled part off. In the second round commence the stroke a little above where the last one ended and be very careful not to cross the paper or to go up again. Ordinary paper cleaned in this way will look fresh and bright and almost as good as new. Some papers, however—and these most expensive ones—will not clean nicely; and in order to ascertain whether a paper

can be cleaned, it is best to try it in some obscure corner which will not be noticed if the result is unsatisfactory. If there be any broken places in the wall fill them up with a mixture of equal parts of plaster of paris and fine sand made into a paste with a little water. Then cover the place with a little piece of paper like the rest if it can be obtained

A GOOD CEMENT

A good cement for mending almost anything may be made by mixing together litharge and glycerine to the consistency of thick cream. This cement is useful for mending stone jars or any coarse earthenware, stopping leaks in seams of tin pans, wash boilers, cracks and holes in iron kettles, etc. Holes an inch in diameter in kettles may be filled and used the same for years in boiling water and feed. It also may be used to fasten on lamp tops, to tighten loose knots, to secure bolts where the knots are loose, to tighten loose joints of wood or iron, loose boxes in wagon hubs, and in a great many other ways. In all cases the articles mended should not be used until the cement is hardened, which will require from one day to a week, according to the quantity used. This cement will resist the use of water, hot or cold, acids, and almost any degree of heat.

TO STAIN MUSICAL INSTRUMENTS

Boil one pound of ground Brazil wood in three quarts of water for one hour. Strain it, then add half ounce of cochineal. Boil ½ hour longer. This makes a crimson stain.

STAINING WITH IODINE

Wood may acquire an oak, walnut or cherry tree color, by staining it with ordinary tincture of iodine, diluted with spirits until the exact shade is obtained. While shellac must be added to the iodine solution if the stain is to be made permanent, or the wood after the stain is applied may be French polished. The iodine may be laid on with a rag or a brush.

STAIN FOR FLOORS

The best, cheapest and only permanent stain for floors is permanganate of potash to be obtained at any drug store. Mix about ¼ ounce to a quart of water. Apply freely and quickly to a dry floor with a brush so as not to stain the hands. Repeat the process if a very dark color is desired. When dry, oil with burnt linseed oil or beeswax and turpentine. You cannot wash this color out, as it actually stains the wood. When applying this at first, for a few

moments the color is bright magenta; but this at once changes to a dark, permanent brown. This makes a very cheap stain.

CEMENT FOR KEROSENE OIL LAMPS

A cement commonly used for fastening the tops on kerosene lamps is plaster of paris, which is porous and quickly penetrated by the kerosene, when it breaks off. Another cement which has not this defect is made with three parts of resin, one of caustic soda and five of water. This composition is mixed with half its weight of plaster of paris. It sets firmly in about three-fourths of a hour and has great adhesive power and is not permeable to kerosene

CHAPTER XX.

ABOUT THE HOUSE

Need of a Handy Man—A Barometer—Hanging Wall Paper—A Dog House—A Writing Desk—To Cut Glass.

Every day, every hour, either in or around the household, there is something which calls for the attention and skill of the Handy Man, from fixing the shelves in the kitchen closet to tuning the family piano. He has a vast field in which to exercise his handiwork and display his knowledge.

Every man can be a handy man in the household if he will but try.

"Try" is a small word, but it has a mighty significance.

We can never accomplish anything if we don't try. A man never knows his own possibilities until he puts them to the test. Never say, "I can't do it," but always say "I'll try to do it."

A child will never walk unless it makes the attempt. A man need not be a trade

expert to attend to the little things that crop up in everyday life. An amateur cannot do the work of a professional. Otherwise, there would be no necessity to devote years to the learning of the trades and professions.

But every man should be able to use his hands to some purpose in attending to everyday wants. He should be ashamed to have to call in the help of others to accomplish trivial things.

Why cannot one do the same as another? We are all physically made alike, each of us has two hands and ten fingers. Laziness and carelessness have much to do with the inability of men to do their own work.

Brown makes a breadbox for his wife, while Jones looks on, and when Jones's wife asks her husband to make a breadbox, he tells her, "I can't." Why? He has hands and fingers just the same as Brown, and Brown has not been bred to the trade of a carpenter any more than Jones. But Brown tries and he accomplishes. Jones is too lazy to try.

Therefore, try, and if you do not succeed after earnest effort, you will deserve credit for the attempt.

A CHEAP BAROMETER

Take an eight-inch bottle having the glass

clear and white, and put into it six ounces of highly colored alcohol. Then into this put all the gum-camphor it will dissolve, and a little more.

On the approach of rain or bad weather the camphor will settle towards the bottom of the bottle. The heavier the rain the closer the camphor will settle towards the bottom. If fair weather is approaching the camphor will rise and float in the liquid in a feather-like appearance.

HOW TO MAKE A HAMMOCK

Get an old flour barrel from the cellar or storeroom. Knock it to pieces, clean and paint the staves. Procure a rope four times the length of the place where it is to be suspended and in size a little larger than a clothesline. Now halve the rope. Double each piece in the middle, and commencing two yards or so from the end, weave it over and under each stave about three inches from the end of each one, which will bring the rope crossed between each. Do both sides the same and your hammock is complete.

HANGING WALL PAPER

Make the paste with boiling water and let it boil about as long as common starch,

and have it no thicker than starch after it is cold. Let it cool and strain it through a common salt sack to take out the lumps. Then take a piece of washing soda as large as a plum, dissolve in water and put it in the paste. There is then no need of glue or anything else whatever.

Let an assistant hold the paper up to the wall so that it will match with the piece already on, and cut it off the right length—always half an inch short, as it will stretch that much.

Lay the paper wrong side up on a large table; let your assistant hold one end while you put on the paste quickly and evenly with a whitewash brush. Be sure to get every part covered. Take hold of the upper end, while your assistant takes the lower end. Fasten it at the top, then sweep it down with a soft broom or brush. Pick all windy places with a pin and pat gently with a soft cloth. If it should become fast at the bottom too soon for the rest, pull it out carefully from the wall and replace it again.

Paper put on with washing soda in the paste will not crack and come loose on greasy walls, as it often does without it.

A DOG HOUSE

Get a few dry goods or packing boxes,

and knock them asunder, taking out the nails. First prepare the boards for the floor which should be about three feet square. Fasten them together by strips of wood nailed across the under side. For the sides of the kennel the boards should be sawed off in lengths of about two feet, the corner boards six inches wide and planed off on the inner sides to join with the sides of the house. Five inches from the top of the corner boards cut openings three inches square. When the kennel is completed glass may be fastened back of these openings for windows. Nail strips two inches wide across the top and bottom of the sides on the inside, the lower strip to support the floor. Leave an opening for a door nine inches wide and twenty-one inches from the ground line. After the sides are fastened to the floor, nail a lath along the tops of the sides coming out square at the angles. Out of thin boards saw eight brackets three inches wide by eight inches long and screw them to the sides through the lath at the top.

For a base nail on a board 2½ inches wide and as a trim for the door nail a lath along the sides and top. For the sides of the roof lay as many boards as will make the full width close alongside of one another and saw them off. Nail a strip about two inches wide across the inner side to hold

the boards together. The pieces which will form the ridges or angles of the roof are to be planed off on the inner edge so as to join them with one another. When the four sides of the roof are sawed out, fasten them together by nailing along the ridges; then nail strips of tin three inches wide along the ridges to cover the joints. Place the roof in position on the body of the kennel and fasten it on by nailing to the lath along the top of the body.

A cheap ornament for the top can be made by sawing three inches off a broom handle to which a little pyramid, or cone of wood can be nailed with the apex pointing upward. In painting, give the roof and door trim two coats of Indian red, and the body, brackets, and top ornament two coats of olive green.

A WRITING DESK

Here is how a handy man made a writing desk for himself. He procured two long planed pine boards nine inches wide and 7-8 of an inch thick. From these boards he cut off two pieces each 3 feet, 6 inches long for the sides of the desk. On each of these he measured off along the edge, five inches from the end which was to be the bottom, and a second distance of eighteen

inches further up. From these points he sawed back diagonally two inches, and cut the space out with a chisel, leaving that part seven inches wide. Along the same edge he measured three inches from the top end, and along the top from the back edge, two inches. These points he connected by a straight line and sawed off the wedge-shaped piece. At the other end (the foot) he sawed out the notch. This furnished the side pieces.

From the remainder of his two boards he next cut seven pieces, each one foot ten inches long. On one of these he marked the middle (eleven inches from the end), and from this point sawed off, right and left, two edge shaped pieces, three and a half inches wide at the broad end. These pieces he used for brackets. The large piece formed the top of the case. From a second piece he sawed off lengthwise a strip one and one-eighth inches wide; from a third piece, two inches; and from the two others, three inches, giving pieces seven and seven-eighth inches, seven inches, six inches, and three inches wide, besides the narrow strips. The inch-wide strip was cut in two in the middle to be used in making brackets. The three-inch piece formed the foot rest. The several pieces were put together thus: The piece seven and seven-eighth inches wide formed

the top shelf, the seven-inch piece the central shelf, and the six-inch piece the lower shelf. The other six-inch piece was hinged to the middle shelf, so as to give, when opened, a broad writing leaf. The top shelf was six inches above the writing shelf, so that the leaf when closed and buttoned made a secure receptacle for books and papers.

Thus was the desk made at a trifling cost, a little over a dollar for wood, hinges, screws, nails and buttons or catches. After it was completed as to workmanship, he purchased at a "Five and Ten Cent" store a can of walnut varnish for ten cents, and this made the desk look as if it had cost fifty dollars.

WHITEWASH

Apart from a sanitary standpoint, a coat of whitewash is almost a necessity to farm outhouses and buildings, such as barns, stables, byre and chicken coops, to give them a neat and clean appearance. In fact, the farm house itself looks best when whitewashed. What is so snug, so cosy, so comfortable looking as a whitewashed farmhouse nestling in the green shrubbery in the summer time, or peeping out from the leafless branches of the trees in winter! It reminds most of us of *home,* of the artless care-free days when the world lay light upon our shoulders. ere the sirens of gold

or ambition lured our feet to wander from the pleasant paths of country life to the din and bustle and strife and sin of the city.

Whitewash when you can, both for health's sake and appearance. Here is the best recipe for making whitewash: Slake one-half bushel of quicklime with boiling water, keeping it covered during the process. Strain it and add a peck of salt, dissolved in warm water; three pounds of ground rice, put in boiling water and boiled to a thin paste, one-half pound of powdered Spanish whiting and a pound of clear glue dissolved in warm water. Mix them well together and let the mixture stand for several days. Keep the wash thus prepared in a kettle or portable furnace, and when used, put it on as hot as possible with a painter's brush or with the so-called whitewash brush which can be obtained in almost every country store. Whitewash thus prepared will answer equally well on wood, brick or stone and is especially adapted for inside use.

For outside use the following recipe will be found very suitable: Take a clean watertight barrel and put into it half a bushel of lime. Slake it by pouring boiling water over it and in sufficient quantity to cover five inches deep, stirring it briskly until thoroughly slaked. When slaking has been effected dissolve in water and add two pounds of sulphate of zinc and one of

common salt. A beautiful cream-color may be communicated by adding three pounds of yellow ochre. This kind of wash will be found very durable, remaining for a long time impervious to the effects of the weather.

HOW TO CUT GLASS

Glass may be cut without the aid of the expensive diamond cutter used by the artisans. A strong pair of scissors and water are all that are required for the purpose. Place the glass under water and cut as required. If a special design is wanted, say a round or an oval piece, draw the shape upon the glass in a black line. Then sink it with your left hand under water as deep as you can without interfering with the view of the line, and with your right use the scissors to cut out the part you desire.

UPHOLSTERING OLD CANE CHAIRS

When a cane seat of a chair is broken it may be made as good as new by upholstering it at home. After removing the superfluous bits of cane, cover the space with matting formed of three-inch wide canvas belting woven together. Tack it temporarily in place. After placing over this some coarse muslin draw both smooth and secure at the edge with twine, making use of the per-

forations. Remove the tacks, turn the raw edge over toward the center, and baste it down. Arrange the hair, or wool, or excelsior, or whatever you propose to use for stuffing and keeping it in position by basting over it a piece of muslin. Then carefully fit the repp, pin it in different places until you are certain it is in perfect shape, and tack it permanently, following of course the tracing made for the cane. Cover the edge with galloon to match the repp, using tiny ornamental tacks and tie with an upholsterers' needle in as many places as is desirable, leaving a button on the upper side. When the back of the chair is to be repaired a facing must be tacked on the outside.

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